Service Manual

Pharmaceutical refrigerator

MPR-215F

FILE No.

SANYO Electric Co., Ltd.
Biomedical Business Division

SM9910247

Effective models

This service manual is effective for following models.

Model	Product code	Voltage and frequency
MPR-215F	823 637 51	115V, 60Hz
	823 637 52	220V, 50Hz
	823 637 53	220V, 60Hz
	823 637 54	230/240V, 50Hz

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Specifications

Structural specifications

Item	MPR-215F	
	Refrigerator	Freezer
External dimensions	W540 mm x D557 + (45)*mm x H1794 mm * projection	
Internal dimensions	W455 mm x D470 mm x H917 mm	W420 mm x D342 mm x H267 mm
Effective capacity	176 L	39 L
Exterior	Painted steel	
Interior	Styrene resin	Colored aluminum
Insulation	Rigid polyurethane foamed-in place	
Door	Painted steel, provided with glass window	Painted steel
Shelf	5pcs, Hard steel wire on polyethylene coating Allowable load: 20kg/shelf Inner dimensions; W388 x D325 mm	1pc, Hard steel wire on polyethylene coating Allowable load: 10kg/shelf Inner dimensions; W327 x D250 mm
Lock	1 / cylinder key	
Caster	4	
Leveling leg	2	
Access port	1 at left side (ϕ30mm)	1 at left side (ϕ30mm)
Compressor	Hermetic type Output; 55W	Hermetic type Output; 55W
Refrigerant	R-134a	
Compressor oil	α15HT	
Evaporator	Fin and tube type	Tube on sheet
Condenser	Wire and tube type	Frame pipe
Weight	86 kg	
Lamp	10W bulb x 1	None
Power supply	Local voltage	
Accessories	1 set of key, 2 large clips (for temperature recorder)	
Optional components	Data acquisition system: MTR-5000 Interface board: MTR-480 LAN Interface board: MTR-L03 Temperature recorder for freezer: MTR-4015LH Recorder fixture for MTR-4015LH: MPR-S3 Temperature recorder for freezer & refrigerator: MTR-G3504 Recorder fixture for MTR-G3504: MPR-S7 Temperature recorder for refrigerator: MTR-0621LH	

Control specifications

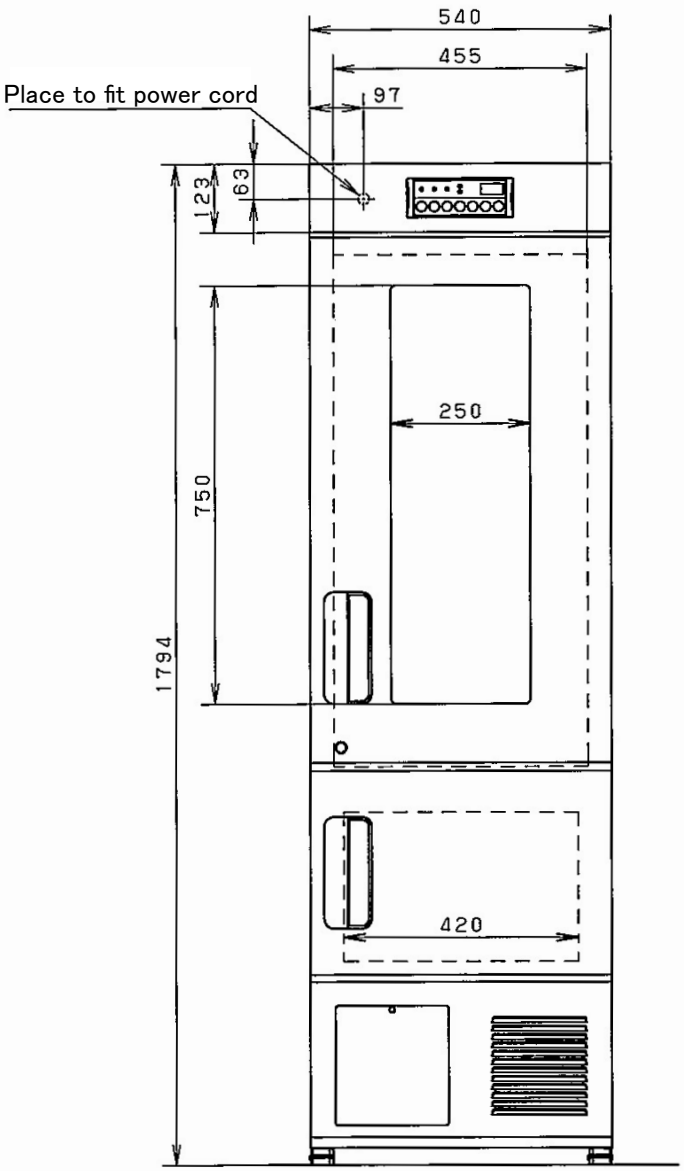
<table>
<tr><td colspan="2" rowspan="2">Item</td><td colspan="2">MPR-215F</td></tr>
<tr><td>Refrigerator</td><td>Freezer</td></tr>
<tr><td colspan="2">Temp Controller</td><td colspan="2">Microprocessor control system</td></tr>
<tr><td colspan="2">Temperature sensor</td><td>Thermistor</td><td>Thermistor</td></tr>
<tr><td colspan="2">Temperature display</td><td colspan="2">Digital temperature display: Green LED (Unit:℃)
Display range: -50℃～+50℃
Switch selectable between refrigerator and freezer</td></tr>
<tr><td colspan="2">Temperature settable range</td><td>+2℃～+14℃</td><td>-35℃～-15℃</td></tr>
<tr><td rowspan="4">Alarms</td><td>High temp.</td><td>Range: Set temp.+ 2℃ ~ + 14℃
Default: Set temp.+ 5℃
ALARM lamp blinks and buzzer sounds intermittently after 15min. of delay.</td><td>Range: Set temp. + 5℃ ~ + 15℃
Default: Set temp. + 10℃
ALARM lamp blinks and buzzer sounds intermittently after 15min. of delay.</td></tr>
<tr><td>Low temp.</td><td>Range: Set temp. - 2℃ ~ - 14℃
Default: Set temp. - 5℃
ALARM lamp blinks and buzzer sounds intermittently after 15min. of delay.</td><td>Range: Set temp. - 5℃ ~ - 15℃
Default: Set temp. - 10℃
ALARM lamp blinks and buzzer sounds intermittently after 15min. of delay.</td></tr>
<tr><td>Door alarm</td><td colspan="2">DOOR lamp illuminates and buzzer sounds intermittently with 2min. of delay.</td></tr>
<tr><td>Remote alarm</td><td colspan="2">Maximum contact capacity; 30VDC, 2A
Remote alarm activates in temperature alarm or power failure.</td></tr>
<tr><td colspan="2">Self-diagnosis</td><td colspan="2">When sensors are malfunction;
● Error code and chamber temperature are displayed alternately.
● Remote alarm contact activates and buzzer sounds intermittently.</td></tr>
<tr><td colspan="2">0℃ alarm</td><td>When chamber temperature is lower than 0℃, ALARM lamp blinks and buzzer sounds without delay.</td><td>None</td></tr>
<tr><td colspan="2">Control panel</td><td colspan="2">DOOR: Door check-lamp
ALARM: Alarm indicator lamp
REFRIGERATOR: Temperature display indicator for refrigerator
FREEZER: Temperature display indicator for freezer
BUZZER: Alarm buzzer stop key
REF./FREEZ.: Temperature display changeover key
SET: Set key
＞: Scroll key
∧: Up arrow key</td></tr>
<tr><td colspan="2">Key lock functions</td><td colspan="2">Press the ＞key for approx. 5 seconds to select key lock status.
L0: Unlocked
L1: Locked</td></tr>
<tr><td colspan="2">Compressor protection</td><td colspan="2">Overload relay and compressor protection sensor</td></tr>
</table>

Performance specifications

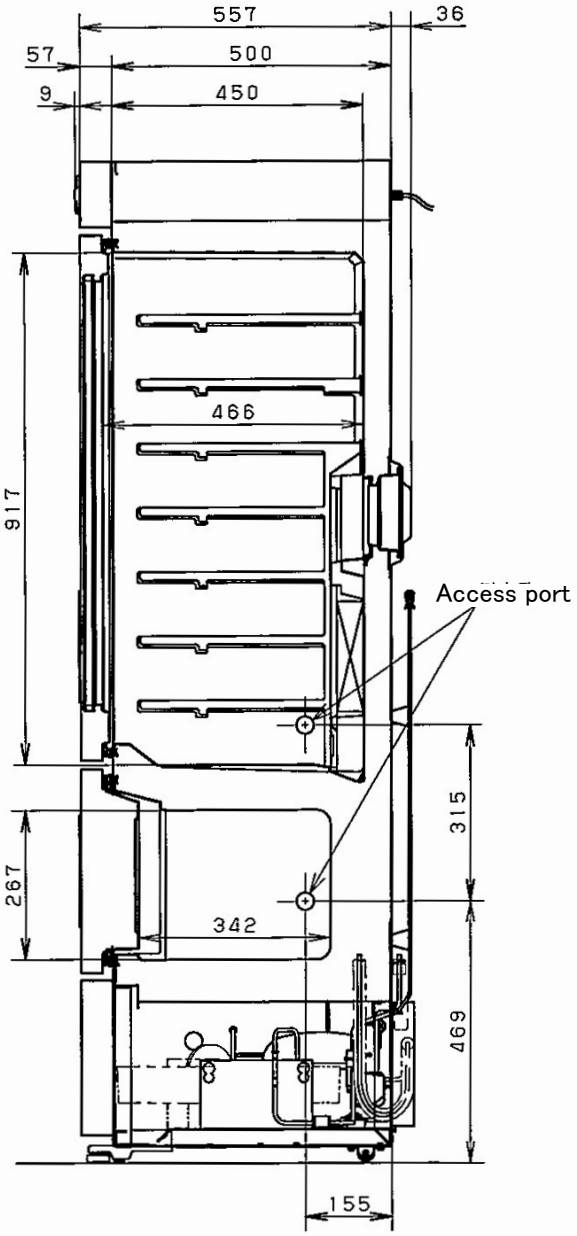
Item	MPR-215F				
	Refrigerator		Freezer		
Temperature control range	2℃~14℃ (AT-5℃~+35℃, no load)		-30℃~-20℃ (AT-5℃~+30℃, no load)		
Noise level	35/36 dB (A scale) (50Hz/60Hz)				
Maximum pressure	1900 kPa				
Rated voltage	AC115V	AC220-240V	AC220V	AC220V	AC110V
Rated frequency	60Hz	50Hz	60Hz	50Hz	60Hz
Power consumption	180W	155W	170W	145W	175W
Usable condition	-5℃~35℃, 80% R.H. or less				

Dimensions

〈MPR-215F〉



〈Front〉



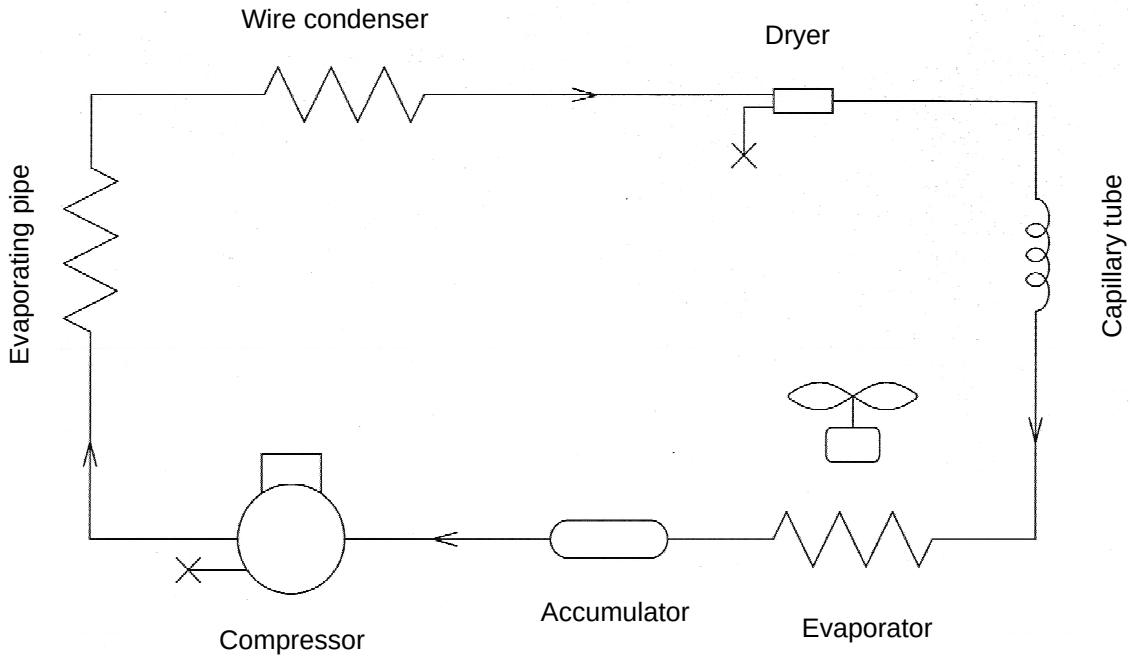
〈Side〉

Cooling unit parts

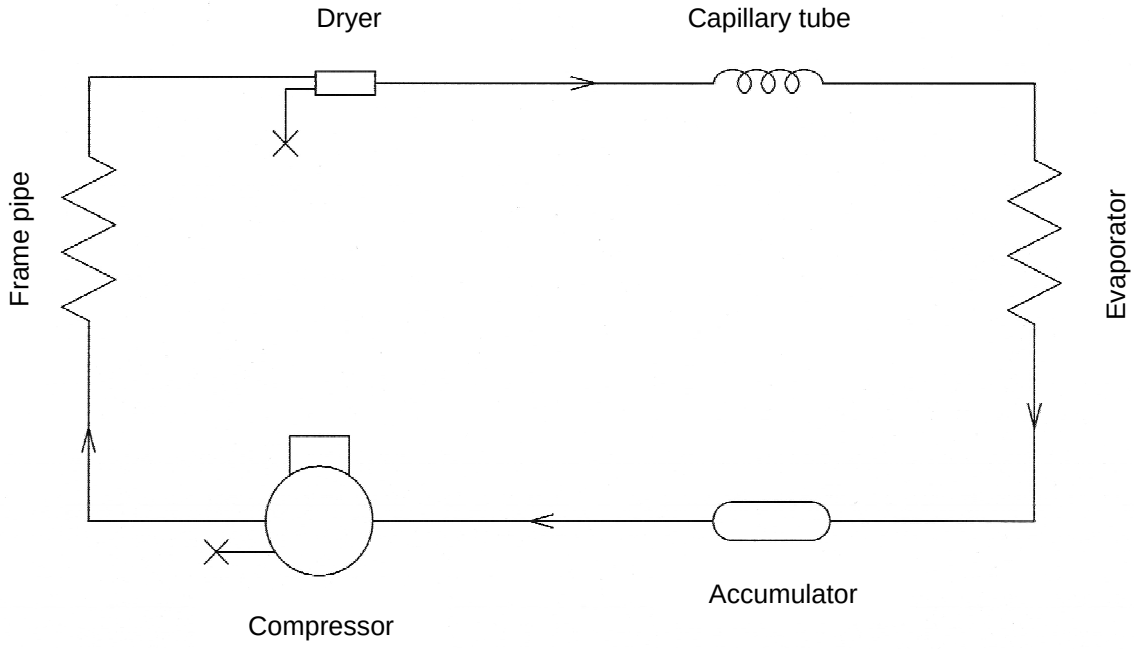
Parts description	Specifications	
	Refrigerator	Freezer
Compressor		
For 110/115V, 60Hz	FL0528-PA	FL0528-PA
Code	7FB-0-M101-014-02	7FB-0-M101-014-02
	Single phase, 110/115V, 60Hz	Single phase, 110/115V, 60Hz
For 220~240V, 50Hz	FL0528-SF	FL0528-SF
Code	7FB-0-M101-014-03	7FB-0-M101-014-03
Power supply	Single phase, 220~240V, 50/60Hz	Single phase, 220~240V, 50/60Hz
For 220V 60Hz	FL0528-SF	FL0528-SF
Code	7FB-0-M101-014-03	7FB-0-M101-014-03
Power supply	Single phase, 220~240V, 50/60Hz	Single phase, 220~240V, 50/60Hz
Refrigeration oil	Type：α15HT Charged q'ty：200+/-10ml	Type：α15HT Charged q'ty：200+/-10ml
Cooling system	Air cooling by fan	Air cooling by fan
Condenser Type	Wire and tube ϕ4.76×P40 mm W480mm x 18columns x 1 line	------
Frame pipe	-----	ϕ4.0 X T0.5 X L5631 mm
Evaporator Type	Fin and tube type 2 lines×8 columns	Direct cooling tube on sheet type 1 line x 24 columns
Accumulator	ϕ38×L125 mm	ϕ30×L120 mm
Capillary tube		
Resistance	0.59MpaG	0.83MpaG
Length L	2000 mm	5600 mm
Outside diameter OD	ϕ1.8 mm	ϕ1.8 mm
Refrigerant	R-134a Charged q'ty：85g	R-134a Charged q'ty：85g
Dryer	4XH-9 Charged q'ty： 8g	4XH-9 Charged q'ty： 8g
Condensing fan motor		
For 110/115V, 60Hz	Type: FL2-011K1M Output: 1W	------
For 220-240V, 50Hz	Type: FL2-011K5M Output: 1W	------
For 220V, 60Hz	Type: FL2-011K5M Output: 1W	------
Cooling fan motor		
For 110/115V, 60Hz	Type: FL2-011B1MP Output: 1W	
For 220-240V, 50Hz	Type: FL2-012BM5P Output: 1W	
For 220V, 60Hz	Type: FL2-012BM5P Output: 1W	

Cooling circuit

< Refrigerator >

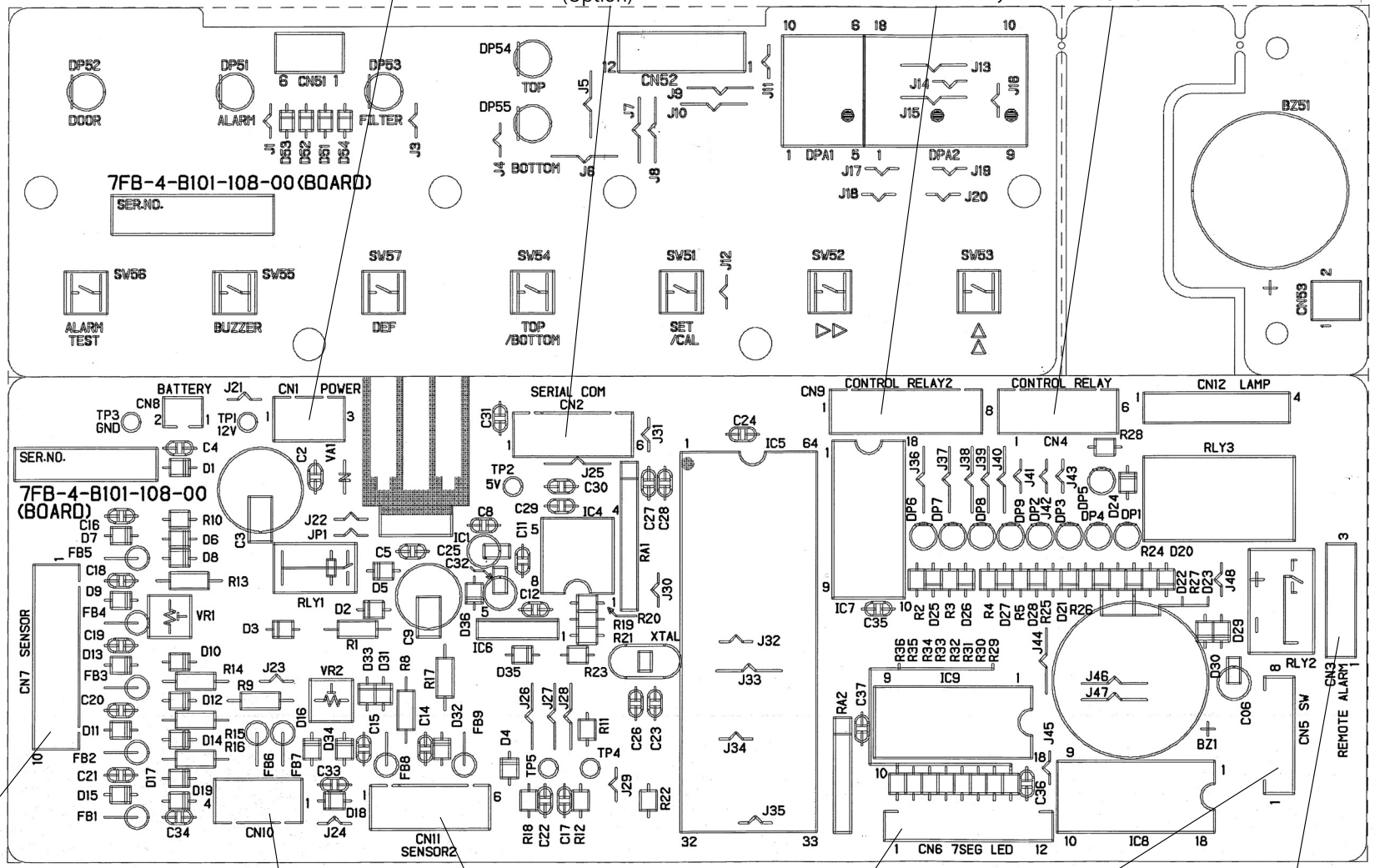


< Freezer >



×--- Point to pull vacuum

Components on PCB



CN1
#1-#3
Switching power supply

CN2
#1-#6
MTR-480/MTR-L03
(Option)

CN9
#1-#2
F.Power relay

CN4
#1-#2 R.Power relay
#5-#6

CN7
#1-#2 Door SW
#3-#4 R.Temp. sensor
#5-#6 R.Defrost sensor
#7-#8 R.Room thermal sensor
#9-#10 R.comp.sensor

CN10
#4 Door switch

CN11
#1-#2
F.Temp.sensor

CN6
#1-#12
Display PCB (CN52)

CN5
#1-#6
Display PCB (CN51)

CN3
Remote alarm terminal
#1 COM
#2 N.O.
#3 N.C.

Connections on PCB

The following shows connections of connectors (CN) on temp. control PCB.

Connector	Connects to	Usage
CN1	Switching power supply #1 12VDC #3 GND	Power supply to PCB.
CN2	Interface board	MTR-480/L03 for optional connection
CN3	Remote alarm terminal ・#1 COM ・#2 N.O. ・#3 N.C.	Open between #1 and #2 in normal condition. Close between #1 and #2 in power failure or alarming condition.
CN4	#1 - #2: R. power relay #5 - #6: Room lamp relay	Control of refrigerator temperature ON/OFF control of refrigerator room lamp
CN5	#1 - #6: Display PCB (CN51)	Connects to each switches.
CN6	#1 - #12: Display PCB (CN52)	Connects to each LEDs.
CN7	#1 - #2: Door switch #3 - #4: R. temp. sensor #5 - #6: R. defrost sensor #7 - #8: R. room thermal sensor #9 - #10: R. comp. sensor	Control of door open and shut Sensing of refrigerator temperature Sensing of pile of frost on evaporator Sensing of temperature rising of refrigerator Sensing of compressor temperature
CN8	Unused	
CN9	#1 - #2: F. power relay	Control of freezer temperature
CN10	#4: Door switch	Control of door open and shut
CN11	#1 - #2: F. temp. sensor	Sensing of freezer temperature

Electric components

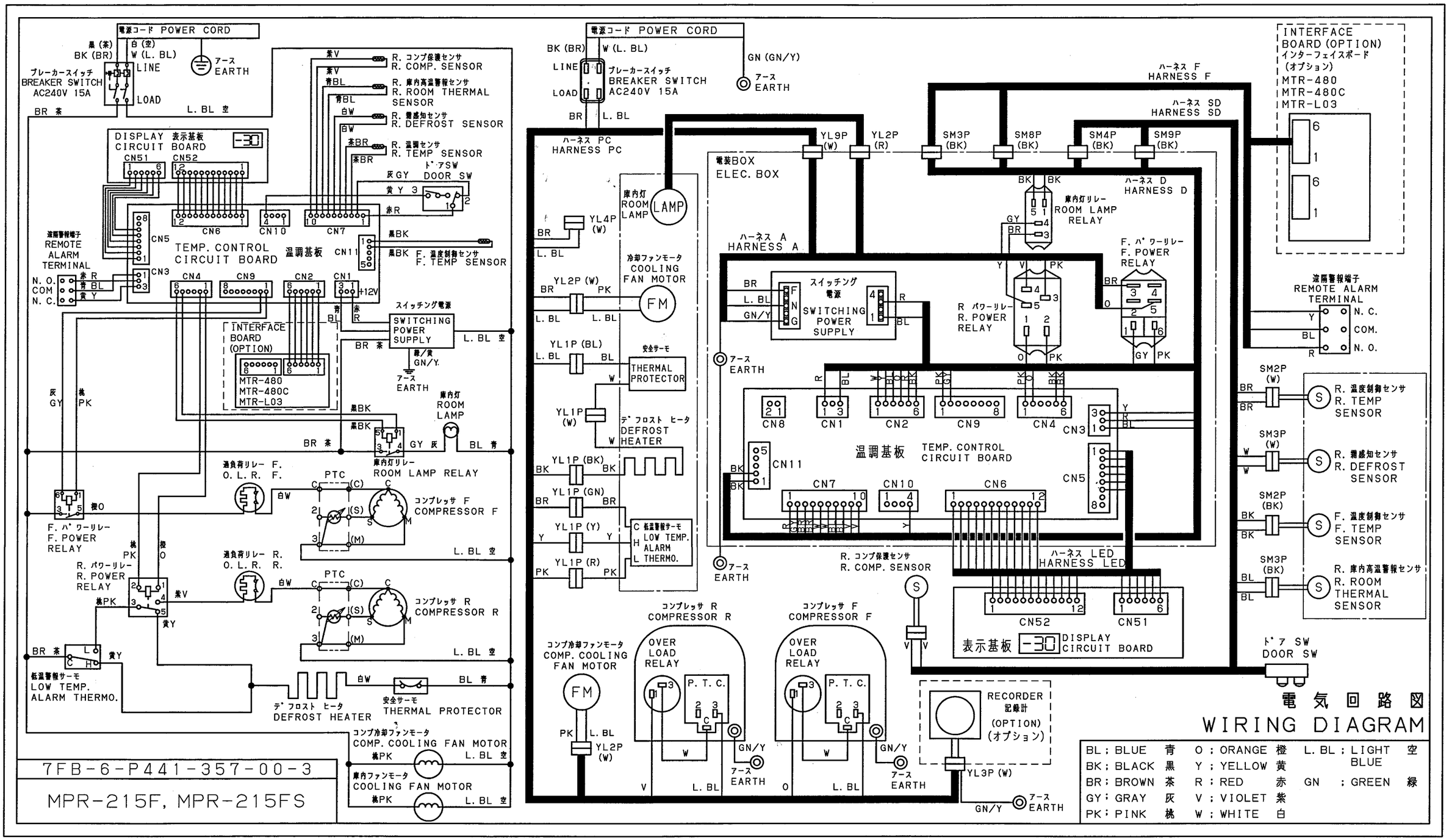
MPR-215F		AC110/115V, 60Hz	AC220~240V,50Hz	AC220V,60Hz
Compressor R/F	Type	FL0528-PA	FL0528-SF	FL0528-RA
	Code	7FB-2-M101-014-02	7FB-2-M101-014-03	7FB-2-M101-014-04
	Rated voltage (50/60Hz)	AC100V, 50/60Hz	AC220-240V, 50Hz	AC220-240V, 50Hz
	Winding resistance C-M(Main)	6.39Ω	34.3Ω	30.4Ω
	C-S(Aux)	7.81Ω	40.0Ω	30.9Ω
PTC	Type	P3T0SAT	PET0SAT	PET0SAT
	Rating	3.9Ω (AT25℃)	22Ω(AT25℃)	22Ω(AT25℃)
Overload relay R/F	Type	2.8C36C1	1.0C36C1	1.2C36C3
	Action to the temp. (No current)			
	OFF	130+8/-9℃	130+8/-9℃	130+8/-9℃
	ON	60+7/-5℃	60+7/-5℃	60+7/-5℃
	Action to the current (AT25℃)	9.6A	3.7A	4.5A
	Operation time	10+/-4 sec.	10+/-4 sec.	10+/-4 sec.
Cooling fan motor	Type	FL2-011K1M	FL2-011K5M	FL2-011K5M
	Rating	AC110V, 1W	AC230V, 1W	AC230V, 1W
Comp. cooling fan motor	Type	FL2-011BM1P	FL2-011BM5P	FL2-011BM5P
	Rating	AC110V, 1W	AC230V, 1W	AC230V, 1W
	Temp. fuse	145℃	145℃	145℃
Defrost heater	Rating	46.3W, AC115V	46.3W, AC230V	46.3W, AC230V
	Resistance (AT25℃)	285.6Ω	1142.5Ω	1142.5Ω
F. power relay	Type	JC1AF-TM	JC1AF-TM	JC1AF-TM
	Contact capacity	15A, AC250V	15A, AC250V	15A, AC250V
	Coil	DC12V	DC12V	DC12V
R. power relay	Type	G4F-1123T-U	G4F-1123T-U	G4F-1123T-U
	Contact capacity	20A, AC250V	20A, AC250V	20A, AC250V
	Coil	DC12V	DC12V	DC12V
Room lamp relay	Type	G2R-1A-T	G2R-1A-T	G2R-1A-T
	Contact capacity	10A, AC250V	10A, AC250V	10A, AC250V
	Coil	DC12V	DC12V	DC12V
Room lamp	Type	125V, 10W	110V, 10W	110V, 10W
	Clasp	E17	E17	E17
Switching power supply	Type	ZWS10-12/J	ZWS10-12/J	ZWS10-12/J
	Rating	DC12V, 0.85A	DC12V, 0.85A	DC12V, 0.85A
R. comp. sensor	Type	502AT	502AT	502AT
	Rating	5kΩ(25℃)	5kΩ(25℃)	5kΩ(25℃)
R. room thermal sensor	Type	502AT	502AT	502AT
	Rating	5kΩ(25℃)	5kΩ(25℃)	5kΩ(25℃)
R. defrost sensor	Type	502AT	502AT	502AT
	Rating	5kΩ(25℃)	5kΩ(25℃)	5kΩ(25℃)
R. temp. sensor	Type	502AT	502AT	502AT
	Rating	5kΩ(25℃)	5kΩ(25℃)	5kΩ(25℃)
F. temp. sensor	Type	502AT	502AT	502AT
	Rating	5kΩ(25℃)	5kΩ(25℃)	5kΩ(25℃)
Low temp. alarm thermo	Type	WPF3K-114-010	WPF3K-114-010	WPF3K-114-010
	ON	10.1℃	10.1℃	10.1℃
	OFF	2.6℃	2.6℃	2.6℃
Thermal protector	Type	TH-2	TH-2	TH-2
	ON	18℃	18℃	18℃
	OFF	28℃	28℃	28℃
Door switch	Type	S994	S994	S994
	Rating	AC250V, 1A	AC250V, 1A	AC250V, 1A
Breaker switch	Type	BAME2152	BAME2152	BAME2152
	Rating	AC240V, 15A	AC240V, 15A	AC240V, 15A

Specifications of sensor

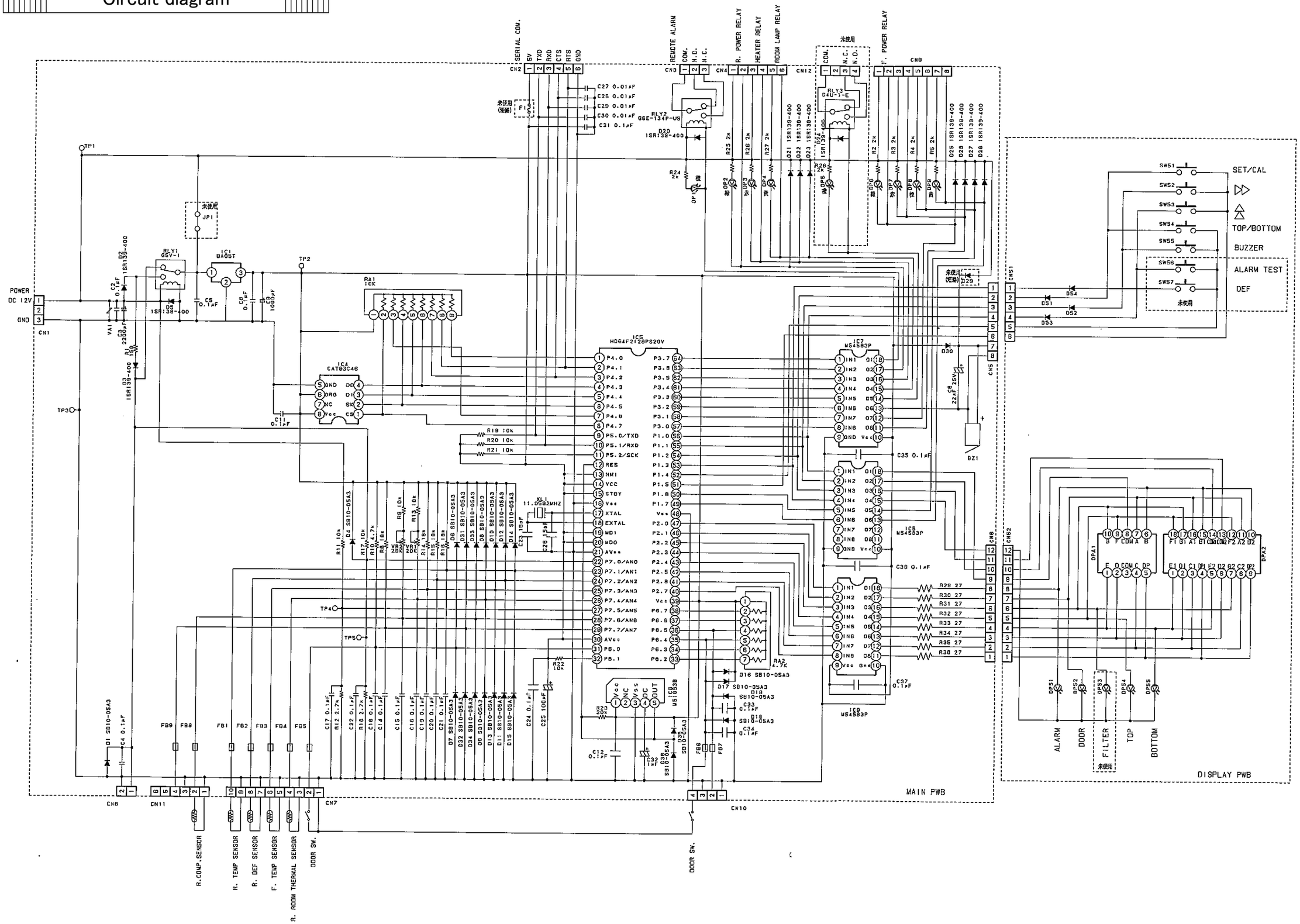
The following shows temperature and resistance characteristics on each thermistor sensor (type 502AT).

Temperature (℃)	Resistance (kΩ)	Temperature (℃)	Resistance (kΩ)	Temperature (℃)	Resistance (kΩ)
−50	154.50	−7	17.92	12	8.17
−45	116.50	−6	17.16	13	7.85
−40	88.85	−5	16.43	14	7.55
−35	68.15	−4	15.74	15	7.27
−30	52.84	−3	15.08	16	6.99
−25	41.19	−2	14.45	17	6.73
−20	32.43	−1	13.86	18	6.48
−19	30.92	0	13.29	19	6.24
−18	29.50	1	12.74	20	6.01
−17	28.14	2	12.22	25	5.00
−16	26.87	3	11.72	30	4.18
−15	25.65	4	11.25	35	3.51
−14	24.51	5	10.80	40	2.96
−13	23.42	6	10.37	45	2.51
−12	22.39	7	9.96	50	2.14
−11	21.41	8	9.57	55	1.83
−10	20.48	9	9.20	60	1.57
−9	19.58	10	8.84		
−8	18.73	11	8.49		

Wiring diagram



Circuit diagram



Control specifications

1. Keys on control panel

BUZZER	When ALARM lamp flashes, buzzer sounds and remote alarm terminal turns over, press this key to silence the buzzer. When ALARM lamp flashes and buzzer does not sound, press this key to remain the buzzer silence. Remote alarm terminal remains inactive.
SET	When this key is pressed, the device steps to Setting mode. When this key is pressed again, the setting value can be memorized.
REF. / FREEZ.	When this key is pressed, temperature display indicator for refrigerator or temperature display indicator for freezer illuminates. The indicator switches to another one every pressing this key.
▶▶ (Scroll key)	In the setting mode, a digit which to be changed can be shift between the 1st digit and the 2nd digit every pressing this key. When a chamber temperature is displayed, press this key for 5 seconds to display setting Key Lock mode. (“L 0” is displayed)
▲ (Up arrow key)	In the setting mode, a blinking digit can be changed every pressing this key. When a chamber temperature is displayed, press this key for 5 seconds to step the device to Function mode. (“F00” is displayed)

2. Temperature control

Settable range	Refrigerator: +2℃ ~ +14℃ Freezer: -35℃ ~ -15℃
Display range	-50℃ ~ +50℃
Setting method	Press REF./FREEZ. Key to select alternative setting temperature for refrigerator or freezer. Press the SET key and change value by pressing ▲ key and ▶▶ key. Press SET key again to memorize the value and to return to chamber temperature display.
Unacceptable range:	If you input a value which deviates from setting range and press SET key, the buzzer sounds for 1 second and the device remains the previous setting value.

3. Alarms

High-temperature alarm:	When the chamber temperature is higher than high temperature alarm setting value, ALARM lamp flashes, the numeric display flashes, and the buzzer sounds intermittently after an approx. 15 minutes of delay and remote alarm output is active. Factory default: Set temp. +5℃ for refrigerator Set temp. +10℃ for freezer
Low-temperature alarm:	When the chamber temperature is lower than low temperature alarm setting value, ALARM lamp flashes, the numeric display flashes, and the buzzer sounds intermittently after an approx. 15 minutes of delay and remote alarm output is active. Factory default: Set temp. -5℃ for refrigerator Set temp. -10℃ for freezer

0℃ alarm: This alarm is for refrigerator only.
when a temperature sensor for refrigerator is lower than 0℃, ALARM lamp flashes, the numeric display flashes, the buzzer sounds intermittently without delay and remote alarm output is active.

Setting method: Press ⏫ key for 5 seconds to step to Function mode ("F00" is displayed), then press ⏫ key to count up through the numbers. A value for high temperature alarm to be input if "F01" is selected, and a value for low-temperature alarm to be input if "F02" is selected. Select one of these and press the SET key to set temperature alarm. Set the desired value with ⏫ key and ⏭ key. Press SET key to memorize the value.

Unacceptable setting range: If you input a value which deviates from the range and press SET key, the buzzer sounds for 1 second and the device remains the previous value.

4. Defrosting

For refrigerator:

1) A unit starts defrosting automatically when DEF sensor temperature reaches -13℃.
   A unit stops defrosting automatically when DEF sensor temperature reaches +5℃.
   "dF" and chamber temperature are displayed alternately during defrosting.
   Temperature alarm will not occur during defrosting.
2) When a temperature sensor temperature reaches set temperature + 7℃, a unit automatically forces to stop defrosting.
   When a unit forces to stop defrosting for two times, it will be automatically stop defrosting for the next time.
3) A unit automatically starts defrosting when compressor runs for 3~4 hours and DEF sensor temperature is less than 0℃.
   When DEF sensor temperature reaches 5℃, a unit will stop defrosting.

For freezer:

1) When setting temperature is 0℃, the compressor for freezer will stop running.
   Defrosting for freezer is performed by manual.
   "dF" and chamber temperature are displayed alternately during defrosting.
   A temperature alarm will not occur during defrosting.
   Change setting temperature to restart freezer operation.
   When the power is interrupted by power failure or turning main power off, a unit will continue to defrost after the power is recovered.

5. Error codes

E01: Temp. sensor for refrigerator is open circuit
E02: Temp. sensor for refrigerator is short circuit
E03: Temp. sensor for freezer is open circuit
E04: Temp. sensor for freezer is short circuit
E05: DEF sensor is open circuit
E06: DEF sensor is short circuit
E07: Alarm sensor is open circuit
E08: Alarm sensor is short circuit
E10: Compressor protection sensor is high temperature
E11: Compressor protection sensor is open circuit
E12: Compressor protection sensor is short circuit

E01: When temp. sensor for refrigerator is open circuited, E01 and -50℃ are alternately displayed.
When DEF sensor temperature is lower than 0℃, compressor will turn off.
When DEF sensor temperature is higher than 7℃, compressor will turn on.

E02: When temp. sensor for refrigerator is short circuited, E02 and +50℃ are alternately displayed.
When DEF sensor temperature is lower than 0℃, compressor will turn off.
When DEF sensor temperature is higher than 7℃, compressor will turn on.

E03: When temp. sensor for freezer is open circuited, compressor will run continuously.

E04: When temp. sensor for freezer is short circuited, compressor will run continuously.

E05: When DEF sensor is open circuited, a unit will not step to defrosting.

E06: When DEF sensor is short circuited, a unit will not step to defrosting.

E07: When alarm sensor is open circuited, a unit will not step to defrosting.

E08: When alarm sensor is short circuited, a unit will not step to defrosting.

E10: When compressor protection sensor is higher than +58℃, E10 will be emit.
When compressor protections sensor is lower than +40℃, E10 will be eliminated.

E11: When compressor protection sensor is open circuited, it is inoperative to protect compressor for refrigerator.

E12: When compressor protection sensor is short circuited, it is inoperative to protect compressor for refrigerator.

6. Key Lock mode

If ⏩ key is pressed for 5seconds or more when a chamber temperature is displayed, a device steps to Key Lock mode and “L 0” is displayed.

Select “1” by pressing ⏫ key ----- Locked
Select “0” by pressing ⏫ key ----- Unlocked

Press SET key to memorize the setting value and a device will automatically return to chamber temperature display.

Note) When “Locked” is selected, the device will step to setting mode, but it is unacceptable to change the value.

7. Auto-return

Function: If there is no key operation for around 90seconds or more in the setting mode, Key Lock mode or Function mode, the device will automatically return to current chamber temperature display without memorizing the value to be changed.

8. Compressor delay

During the cycle, the compressor is forcibly switched off 2minutes since the compressor is forcibly switched off.
Compressor delay time is varied when the power is supplied (the microprocessor resets). (See F05)
The compressor in freezer starts 15seconds earlier than the compressor in refrigerator. During the cycle, one of those compressor starts 9seconds earlier than another.

9. Function mode

F01: Setting of temperature for high temperature alarm for refrigerator
F02: Setting of temperature for low temperature alarm for refrigerator
F03: Setting of temperature for high temperature alarm for freezer
F04: Setting of temperature for low temperature alarm for freezer
F05: Setting of compressor delay time
F06: Setting of service code (384)
*F07: Zero adjustment for temp. sensor for refrigerator
*F08: Zero adjustment for temp. sensor for freezer
*F09: Compressor continuous running mode (for factory use only)
*F10: Program running mode (for factory use only)
*F11: PCB test mode (for PCB manufacturer only)
*F12: Display of temp. sensor temperature for refrigerator
*F13: Display of DEF sensor temperature
*F14: Display of temp. sensor temperature for freezer
*F15: Display of alarm sensor temperature for refrigerator
*F16: Display of compressor protection sensor temperature for refrigerator
*F17: Setting of model code and initialization of non-volatile memory
F21: Setting of communication ID
F22: Setting of communication mode
F24: Linkage between remote alarm and buzzer
F25: Setting of Ring Back time
*F30: Display of ROM version

F32: Display of fan motor accumulation time
*F45: Setting of heater control (for factory use only)
F50: Setting of alarm delay time

* … It is necessary to input service code (384) prior to use the functions.

<How to use Function mode>

Press ⏫ key for 5seconds when chamber temperature display, the device will step to Function mode and “F00” is displayed.
Press ⏫ key to input function code and press SET key.

F01: Setting of high temperature alarm setting value for refrigerator.
Range: Set temperature +2℃ ~ +14℃. (Factory default: +5℃)

F02: Setting of low temperature alarm setting value for refrigerator.
Range: Set temperature -2℃ ~ -14℃. (Factory default: -5℃)

F03: Setting of high temperature alarm setting value for freezer.
Range: Set temperature +5℃ ~ +15℃. (Factory default: +10℃)

F04: Setting of low temperature alarm setting value for freezer.
Range: Set temperature -5℃ ~ -15℃. (Factory default: -10℃)

F05: Setting of compressor delay time.
(This mode is effective only when the main power is supplied)
The aim is to reduce compressor start-up failures and breaker being tripped which are caused by several units starting simultaneously after the power returned from the interruption.
Range: 3 ~ 15 minutes (Factory default: 3 minutes)

F06: Service code “384” should be input for F07 and latter numerical functions which are marked with * in the page XX~XX.
Press SET key to memorize the value and step to Function mode again.
It is unnecessary to input service code for F21, F22 and F25.
Service code can be memorized unless “000” is input again in “F06” or the main power is turned off.

F07: Zero adjustment for temp. sensor for refrigerator
(Input range: -9.9℃ ~ +9.9℃)
Service code should be input prior to use this function.
In “F07” display, press SET key to show “00.0” (Factory default).
Change a value by pressing ⏫ key and ⏭ key
Press SET key to memorize the value.

Ex) When actual 1/2H temperature is 4.2℃ and set temperature is 5.0℃, input “–0.8” (Calculation: 4.2-(5.0)) to the value which is displayed.

F08: Zero adjustment for temp. sensor for freezer
(Input range: -9.9℃ ~ +9.9℃)
Service code should be input prior to use this function.
In “F08” display, press SET key to show “00.0” (Factory default).
Change a value by pressing ⏫ key and ⏭ key.
Press SET key again to memorize the value.

F12: Display of temp. sensor temperature for refrigerator. (Unit: 0.1℃)
Service code should be input prior to use this function.
The display gives the temperature to the first decimal place, but as the display area is 3-digit, the "-" in minus temperatures is not displayed when the temperature is –20℃ or lower.
(Ex. An actual temperature, –35.0℃ will be displayed as "35.0").

F13: DEF sensor temperature is displayed. (Unit: 1℃)
Service code should be input prior to use this function.

F14: Display of temp. sensor temperature for freezer (Unit: 0.1℃)
Service code should be input prior to use this function.
The display gives the temperature to the first decimal place, but as the display area is 3-digit, the "-" in minus temperatures is not displayed when the temperature is –20℃ or lower.
(Ex. An actual temperature, –35.0℃ will be displayed as "35.0").

F15: Display of alarm sensor temperature for refrigerator
(Display range: -50~+110℃)
Service code should be input prior to use this function.

F16: Display of compressor protection sensor temperature for refrigerator
Service code should be input prior to use this function.

F17: Setting of model code and initialization of non-volatile memory
Service code should be input prior to use this function.

<Setting of model code>
In "F17" display, press SET key to show "001" (Factory defualt). Change the value to "002" (MPR-215F) by using ⏫ key and press SET key again to memorize the value.

<Initial values of non-volatile memory>
Set temperature for refrigerator: +5℃
Set temperature for freezer: -30℃
Key Lock: 0 (OFF)
High temp. alarm for refrigerator: Set temperature +5℃
Low temp. alarm for refrigerator: Set temperature -5℃
High temp. alarm for freezer: Set temperature +10℃
Low temp. alarm for freezer: Set temperature-10℃
Zero adjustment for refrigerator: 0℃
Zero adjustment for freezer: 0℃
Communication ID: 000
Communication mode: 000
Ring back time: 030（30minutes）
Linkage between remote alarm and buzzer: Not linked
Temp. alarm delay time: 015 (15minutes)

F21: Setting of serial communication ID
(Input range: 000 ~ 255)
000: Not communicated

F22: Setting of serial communication mode
Control mode (the 3rd digit) 0 : Local (Factory default)
1: Remote
Baud rate (the 2nd digit) 0 : 2400 bps (Factory default)
1: 4800 bps
2: 9600 bps
The 1st digit is unused.

Note) When you set control mode in “remote”, it is impossible to change set temperature through the unit.

F24: Linkage between remote alarm and buzzer
000 : Not linked (Factory default)
001 : Linked

F25: Setting of Ring Back time
(Input range: 000, 010, 020, 030, 040, 050, 060) (Unit: Minute)
000: Ring back is inactive

F30: Display of ROM version
Service code should be input prior to use this function.

F32: Display of fan motor accumulation time
(Unit: Year)

F50: Setting of temp. alarm delay time
(Input range: 000, 001, 002, 003, 004, 005, 006, 007, 008, 009,
010, 011, 012, 013, 014, 015 Unit: Minute)
000: Not delayed

10. Differential value

Refrigerator		Freezer	
Compressor turns on	Compressor turns off	Compressor turns on	Compressor turns off
Set temperature +0.3℃	Set temperature -0.3℃	Set temperature +0.4℃	Set temperature -0.8℃

11. Offset value

The device is offset as follows in order to correct the differential between the temperature detected by temp. sensor and the actual temperature in the center of chamber.

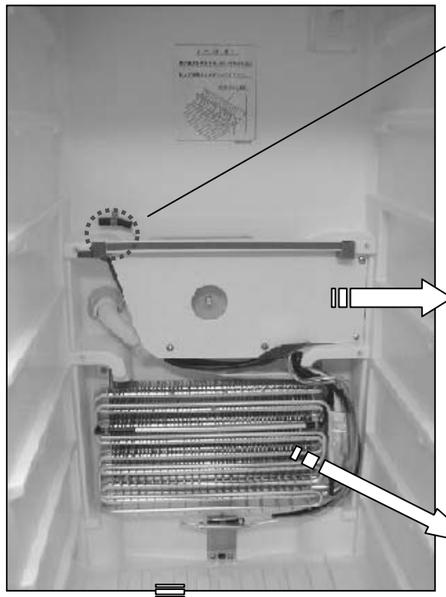
Offset value	
Refrigerator	Temp. sensor temperature -0.5℃
Freezer	Temp. sensor temperature -1.0℃

12. Remote Alarm

	N.O. – COM.	N.C. - COM
Normal	Open	Close
In alarm or power failure	Close	Open

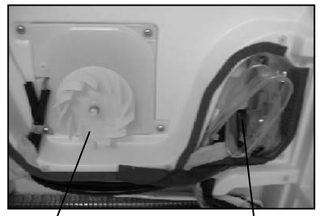
Parts layout

<Inside of refrigerator, mullion is removed>



R. room thermal sensor

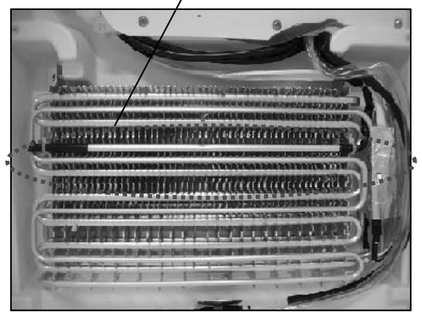
Fan cover is removed



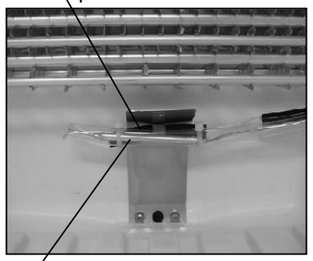
Cooling fan

Low temp. alarm thermo.

R. defrost sensor

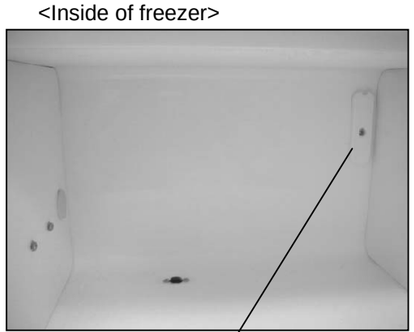


R. temp. sensor

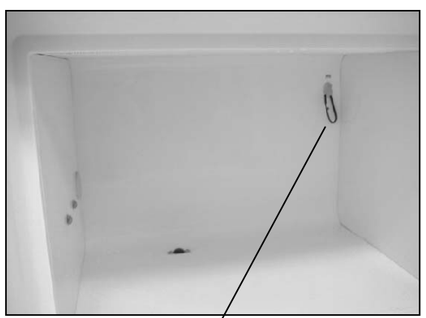


Sensing bar of low temp. alarm thermo.

<Inside of freezer>



F. temp. sensor (Covered)

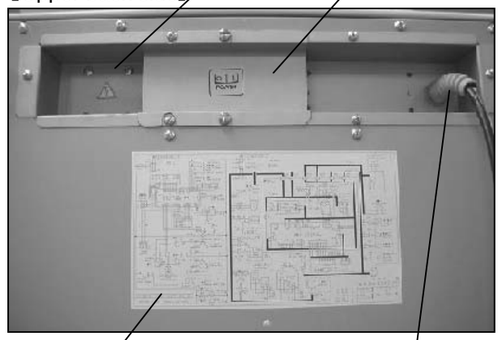


F. temp. sensor (Cover is removed)

Connection for interface

Cover for power switch

【Upper back side】

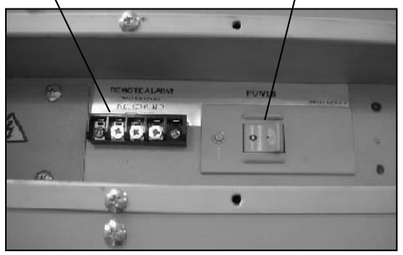


Wiring diagram

Power cord

Remote alarm terminal

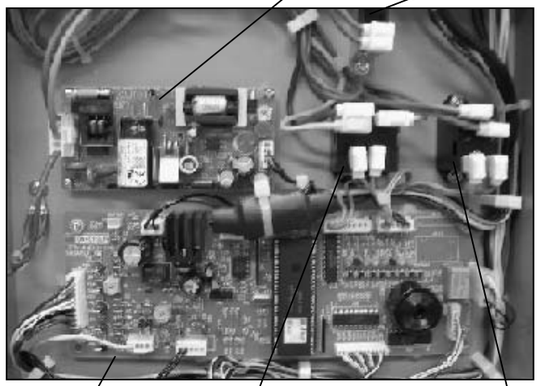
Power switch



Swtiching power supply

【Electric box at ceiling】

Room lamp relay

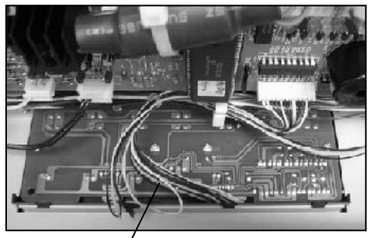


Temp. control PCB

R. power relay

F. power relay

【Back side of control panel】



Display PCB

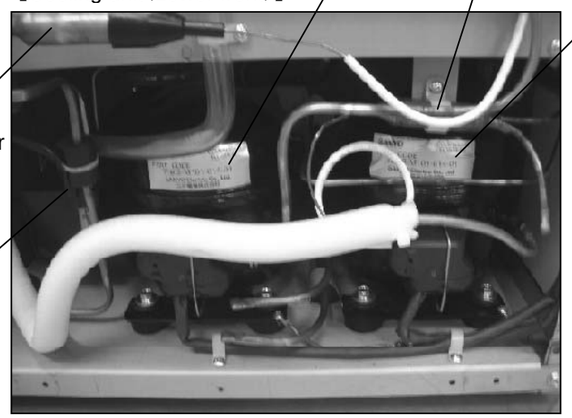
Dryer for freezer

Compressor R

Compressor L

【Cooling unit（Lower front）】

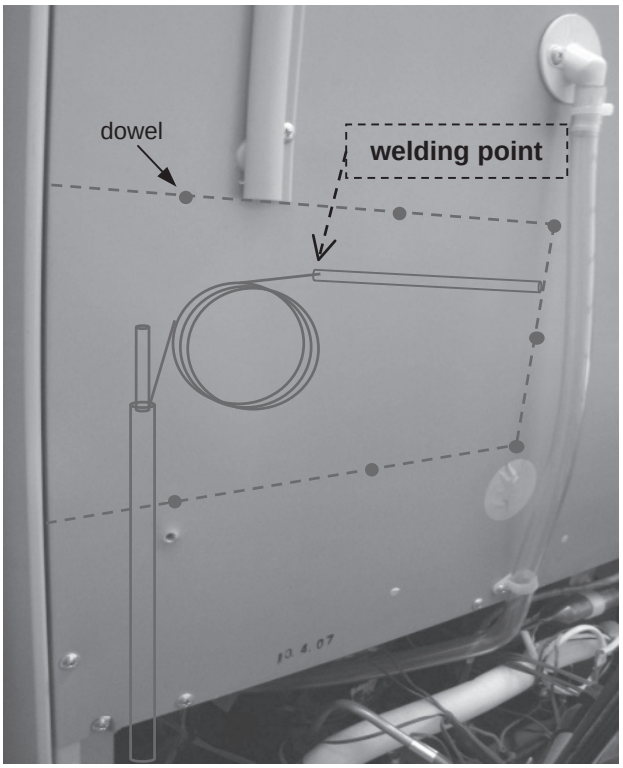
Dryer for refrigerafor



R. comp. sensor

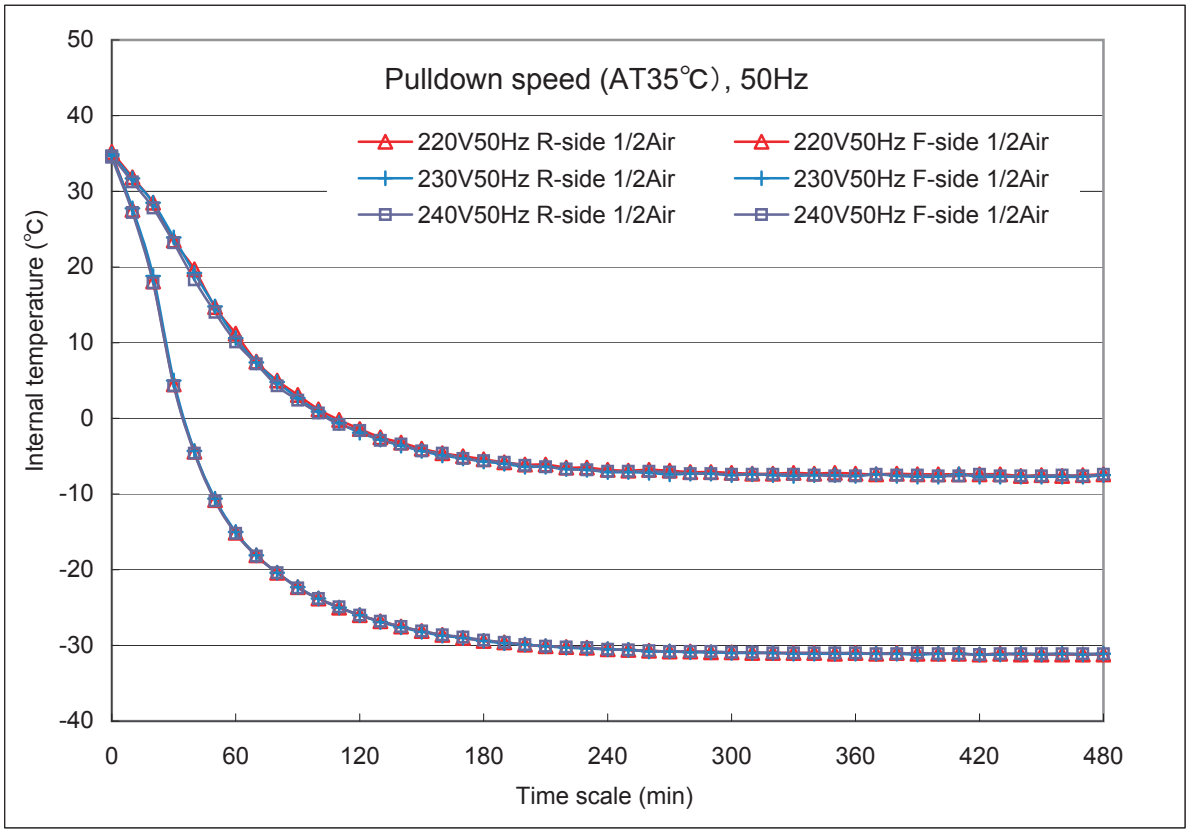
Note for replacing capillary of freezer

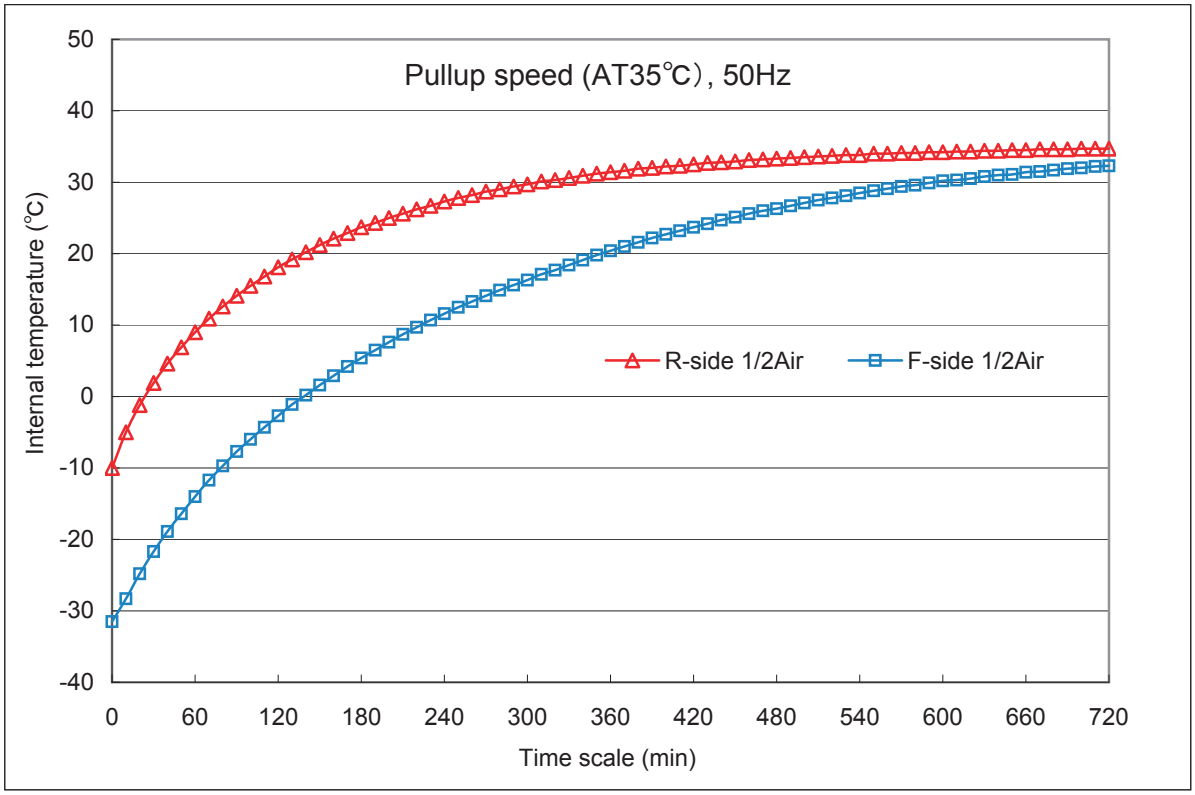
After removing wire condenser, cut a part of rear panel which is marked in the picture by drawing a line temporalily on the 7 dowels of the rear cover.

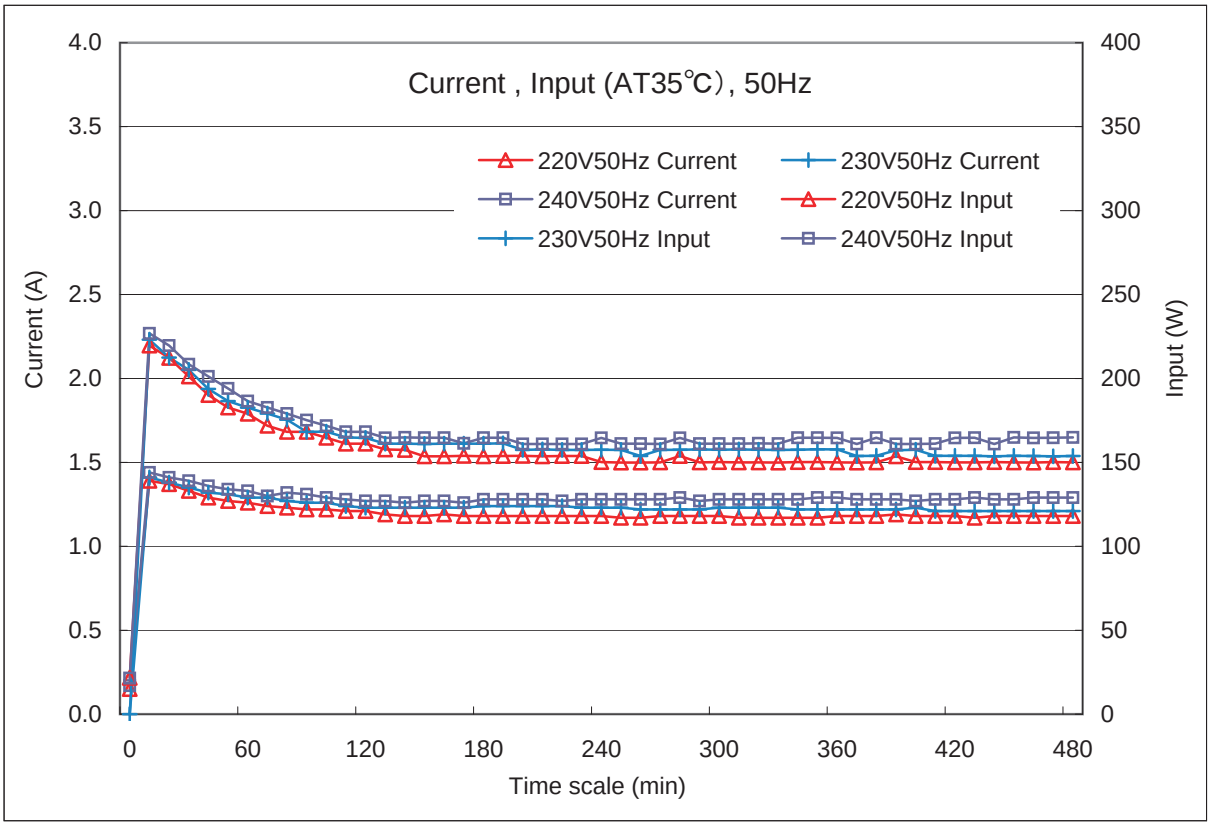


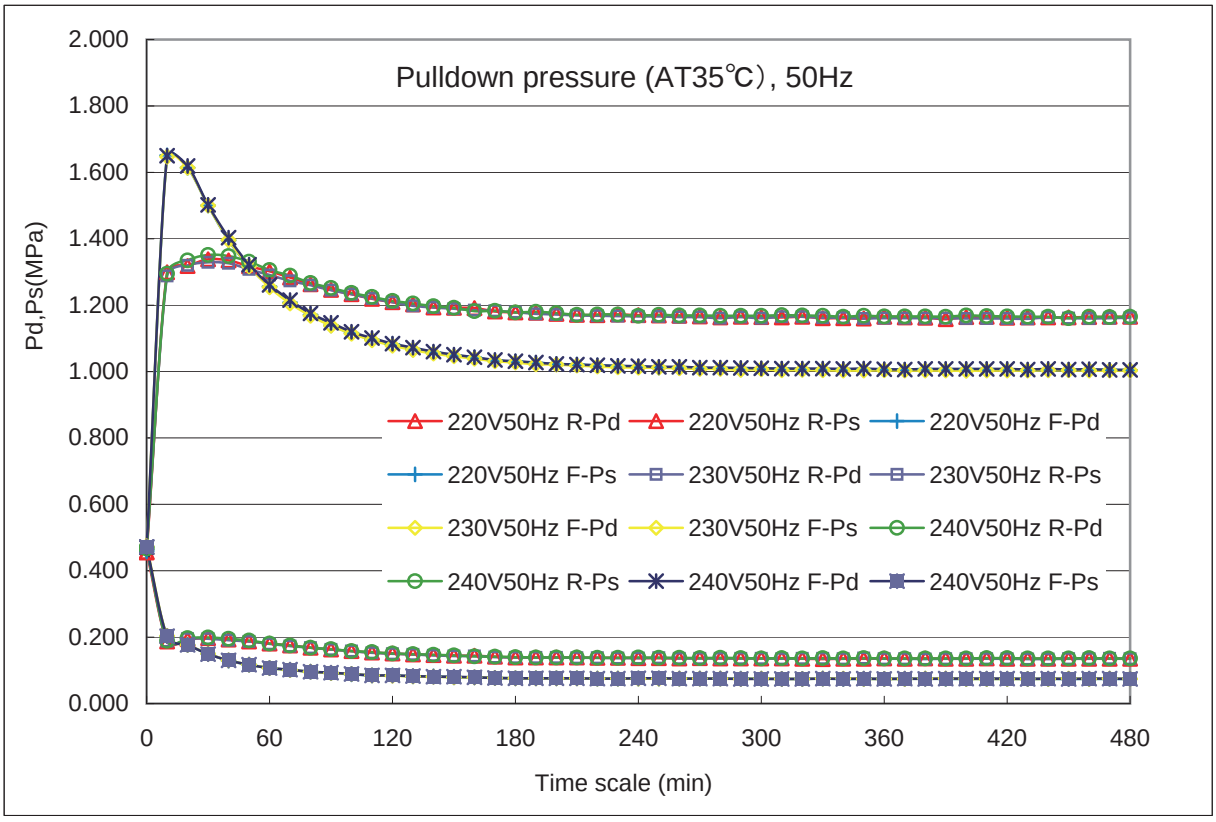
Test data

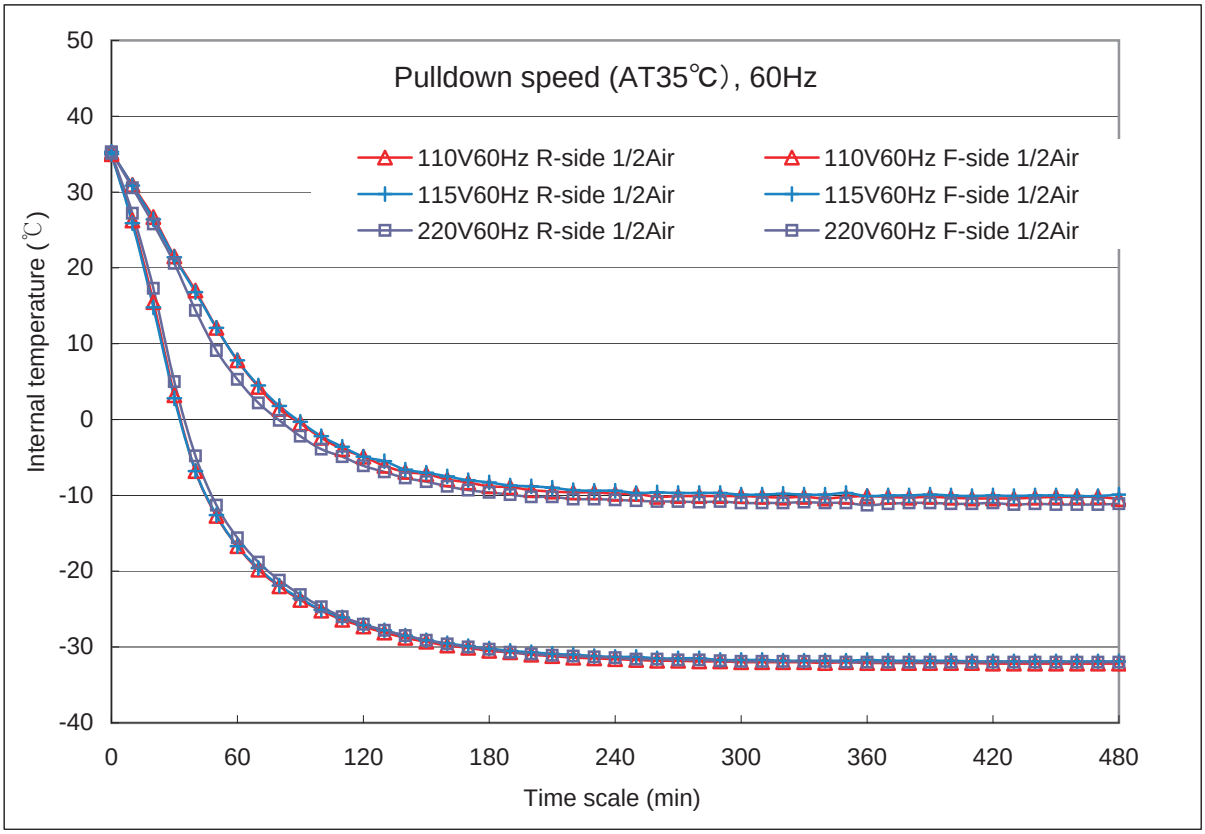
Note) All the data are the reference only.

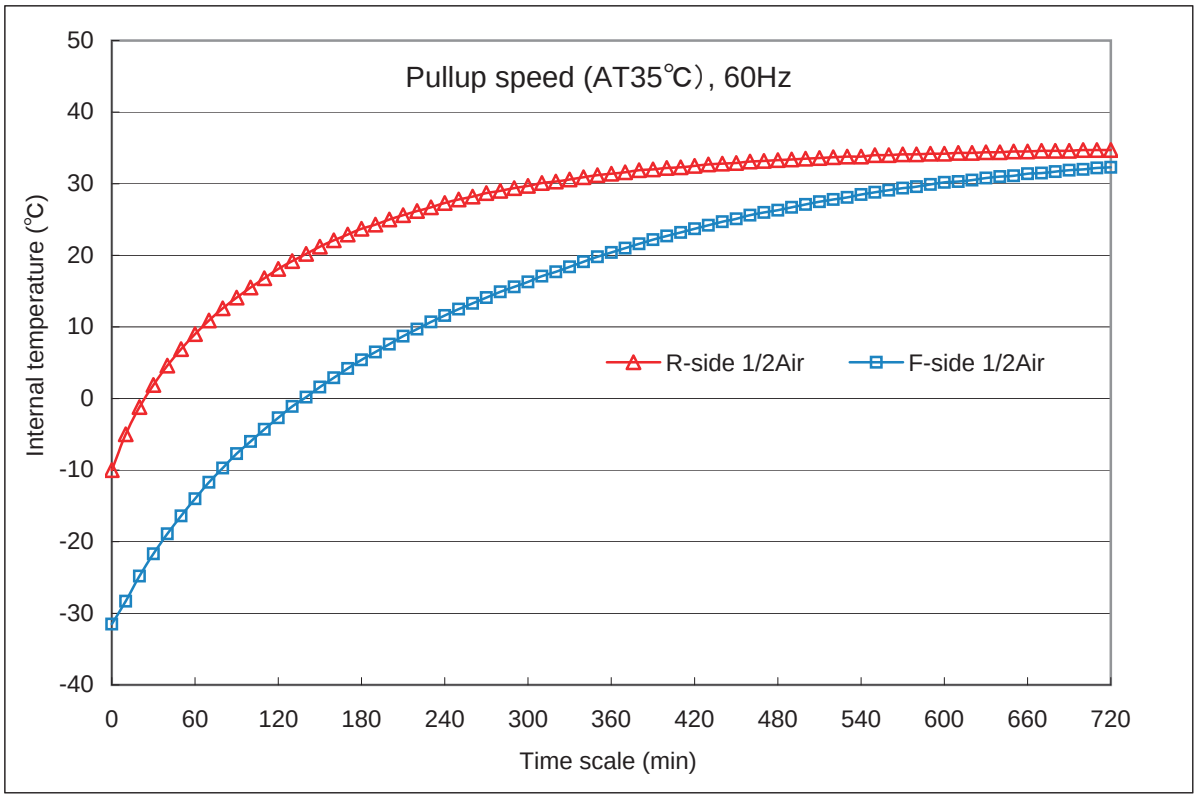


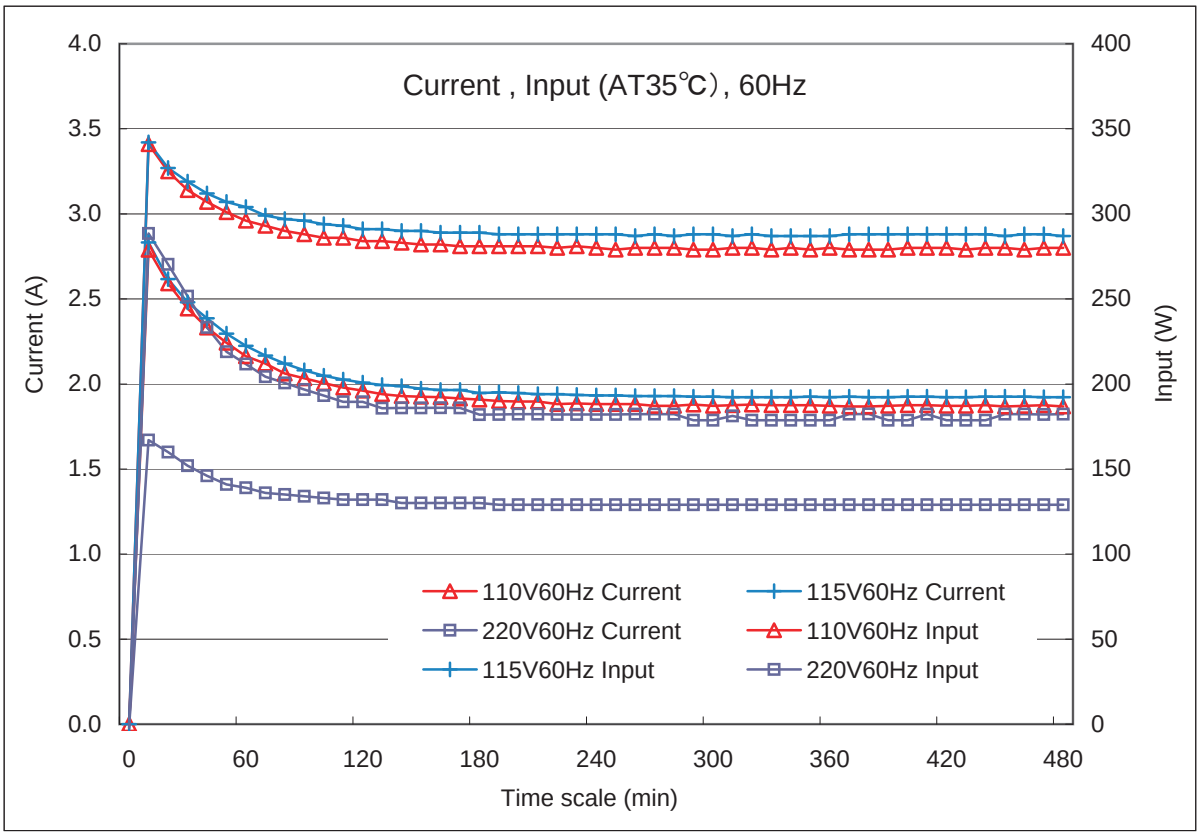


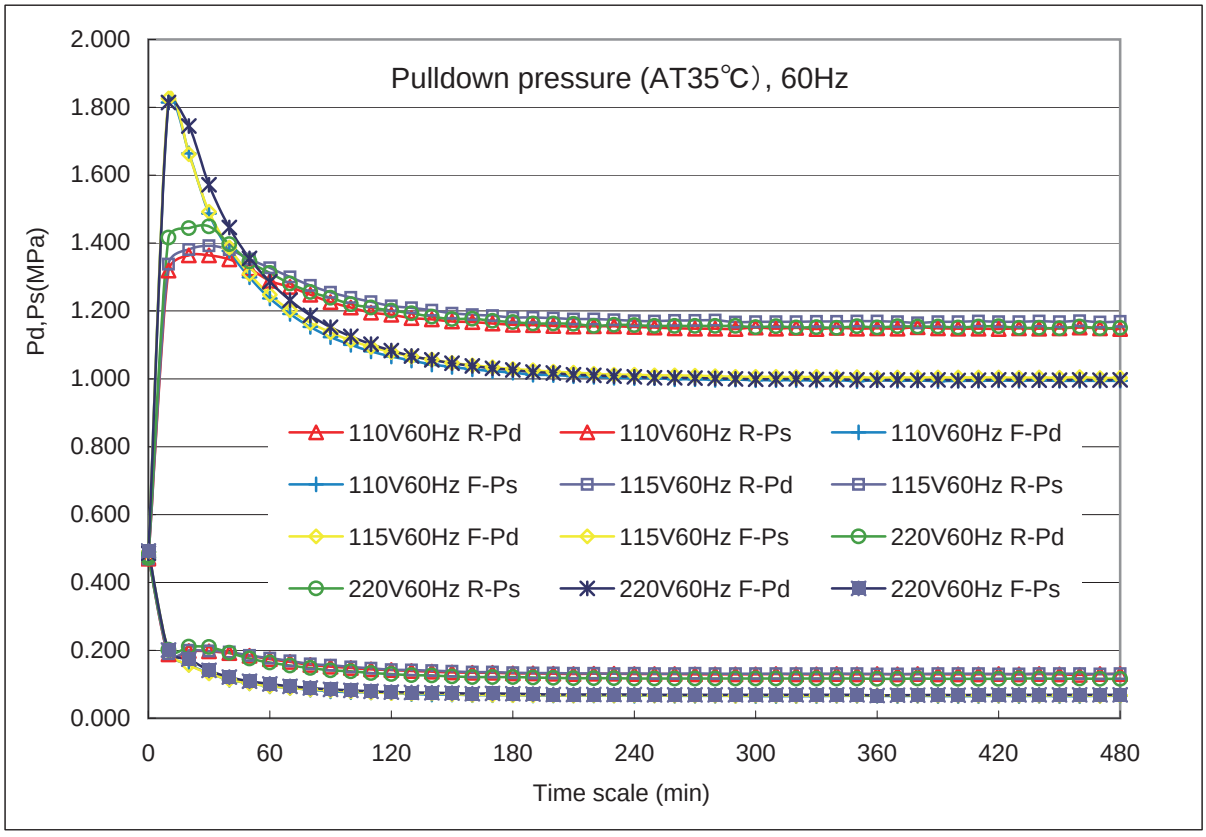

Current , Input (AT35℃), 50Hz
220V50Hz Current
230V50Hz Current
240V50Hz Current
220V50Hz Input
230V50Hz Input
240V50Hz Input
Current (A)
Input (W)
Time scale (min)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
400
350
300
250
200
150
100
50
0
0
60
120
180
240
300
360
420
480


Pulldown pressure (AT35℃), 50Hz
Pd,Ps(MPa)
Time scale (min)
220V50Hz R-Pd
220V50Hz R-Ps
220V50Hz F-Pd
220V50Hz F-Ps
230V50Hz R-Pd
230V50Hz R-Ps
230V50Hz F-Pd
230V50Hz F-Ps
240V50Hz R-Pd
240V50Hz R-Ps
240V50Hz F-Pd
240V50Hz F-Ps
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0
60
120
180
240
300
360
420
480


Pulldown speed (AT35℃), 60Hz
110V60Hz R-side 1/2Air
110V60Hz F-side 1/2Air
115V60Hz R-side 1/2Air
115V60Hz F-side 1/2Air
220V60Hz R-side 1/2Air
220V60Hz F-side 1/2Air
Internal temperature (℃)
Time scale (min)
50
40
30
20
10
0
-10
-20
-30
-40
0
60
120
180
240
300
360
420
480


Pullup speed (AT35℃), 60Hz
R-side 1/2Air
F-side 1/2Air
Internal temperature (℃)
Time scale (min)
50
40
30
20
10
0
-10
-20
-30
-40
0
60
120
180
240
300
360
420
480
540
600
660
720


Current , Input (AT35℃), 60Hz
Current (A)
Input (W)
Time scale (min)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
400
350
300
250
200
150
100
50
0
0
60
120
180
240
300
360
420
480
110V60Hz Current
115V60Hz Current
220V60Hz Current
110V60Hz Input
115V60Hz Input
220V60Hz Input


Pulldown pressure (AT35℃), 60Hz
Pd,Ps(MPa)
Time scale (min)
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0
60
120
180
240
300
360
420
480
110V60Hz R-Pd
110V60Hz R-Ps
110V60Hz F-Pd
110V60Hz F-Ps
115V60Hz R-Pd
115V60Hz R-Ps
115V60Hz F-Pd
115V60Hz F-Ps
220V60Hz R-Pd
220V60Hz R-Ps
220V60Hz F-Pd
220V60Hz F-Ps

Temperatures of components (Reference Data on Maximum cooling)

			Ambient temperature 30℃					
			110V60Hz	115V60Hz	220V50Hz	230V50Hz	240V50Hz	220V60Hz
R-side	Compressor case bottom	(℃)	51.7	51.8	49.4	49.5	49.8	50.3
	Discharge pipe	(℃)	48.4	48.5	45.3	45.3	45.5	47.1
	Wire and tube condensor outlet	(℃)	38.8	38.9	38.6	38.7	38.5	39.0
	Evaporator inlet	(℃)	-23.2	-23.2	-22.4	-22.4	-22.4	-23.9
	Evaporator outlet	(℃)	-23.7	-23.6	-16.4	-16.7	-16.4	-24.6
	Suction pipe	(℃)	31.9	31.9	32.4	32.4	32.4	30.7
	Air temperature at center of chamber	(℃)	-13.5	-13.6	-11.1	-11.1	-11.1	-14.7
	Pd	(MPa)	1.013	1.014	1.013	1.011	1.009	0.999
	Ps	(MPa)	0.110	0.110	0.119	0.118	0.119	0.098
	Current	(A)	1.35	1.37	0.53	0.55	0.57	0.62
	Input	(W)	95.7	97.6	70.6	72.3	74.1	92.1
F-side	Compressor case bottom	(℃)	55.1	55.4	52.1	52.4	53.0	53.7
	Discharge pipe	(℃)	51.5	51.7	47.8	47.9	48.3	48.0
	Frame pipe outlet	(℃)	40.0	40.1	33.6	33.6	33.5	33.8
	Evaporator inlet	(℃)	-37.8	-37.9	-37.3	-37.3	-37.4	-39.7
	Evaporator outlet	(℃)	-38.4	-38.5	-37.8	-37.9	-37.9	-40.2
	Suction pipe	(℃)	29.8	29.8	31.0	31.0	30.9	29.3
	Air temperature at center of chamber	(℃)	-35.3	-35.3	-34.1	-34.1	-34.1	-35.0
	Pd	(MPa)	0.873	0.873	0.871	0.872	0.868	0.864
	Ps	(MPa)	0.057	0.057	0.077	0.077	0.077	0.057
	Current	(A)	1.20	1.24	0.50	0.52	0.55	0.55
	Input	(W)	67.9	69.8	53.9	56.1	58.1	66.4
TOTAL	Current	(A)	2.80	2.88	1.16	1.21	1.27	1.28
	Input	(W)	187.4	192.7	143.2	150.1	154.2	177.6

			Ambient temperature 35℃					
			110V60Hz	115V60Hz	220V50Hz	230V50Hz	240V50Hz	220V60Hz
R-side	Compressor case bottom	(℃)	56.7	57.5	55.5	55.6	56.2	56.0
	Discharge pipe	(℃)	54.4	55.0	52.1	52.1	52.5	53.4
	Wire and tube condensor outlet	(℃)	43.9	44.6	44.3	44.2	44.3	44.3
	Evaporator inlet	(℃)	-20.7	-20.4	-19.4	-19.5	-19.4	-21.3
	Evaporator outlet	(℃)	-20.9	-20.4	-13.5	-13.4	-13.8	-21.4
	Suction pipe	(℃)	36.1	36.7	37.4	37.4	37.6	35.3
	Air temperature at center of chamber	(℃)	-10.3	-10.0	-7.5	-7.6	-7.6	-11.1
	Pd	(MPa)	1.151	1.172	1.168	1.165	1.169	1.149
	Ps	(MPa)	0.124	0.126	0.132	0.132	0.133	0.113
	Current	(A)	1.32	1.35	0.55	0.55	0.58	0.63
	Input	(W)	91.8	93.3	75.5	76.0	78.9	95.1
F-side	Compressor case bottom	(℃)	59.4	60.4	57.9	58.3	59.4	59.3
	Discharge pipe	(℃)	56.6	57.5	54.1	54.4	55.3	54.4
	Frame pipe outlet	(℃)	45.2	46.1	39.0	38.9	39.0	39.1
	Evaporator inlet	(℃)	-34.8	-34.5	-34.5	-34.5	-34.5	-37.0
	Evaporator outlet	(℃)	-35.4	-35.1	-35.1	-35.1	-35.0	-37.4
	Suction pipe	(℃)	33.5	33.9	36.1	36.0	36.0	33.8
	Air temperature at center of chamber	(℃)	-32.2	-31.9	-31.2	-31.2	-31.1	-32.0
	Pd	(MPa)	0.999	1.008	1.009	1.007	1.010	0.998
	Ps	(MPa)	0.067	0.069	0.084	0.085	0.085	0.065
	Current	(A)	1.19	1.23	0.50	0.51	0.55	0.55
	Input	(W)	67.3	68.7	56.1	57.4	60.7	67.7
TOTAL	Current	(A)	2.77	2.85	1.18	1.21	1.29	1.29
	Input	(W)	183.3	187.6	150.4	153.7	163.8	181.7

Note) The data are the reference only.

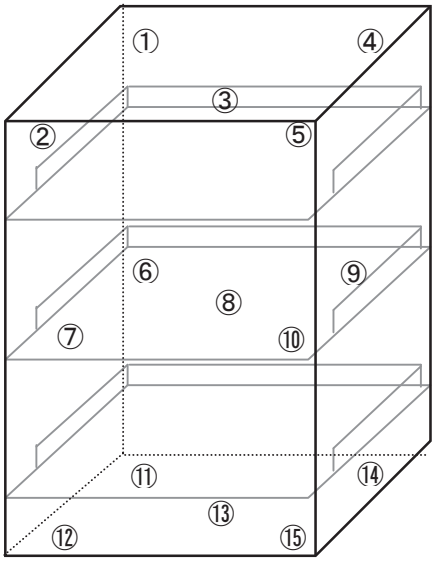
Temperature Uniformity data (15points measured)

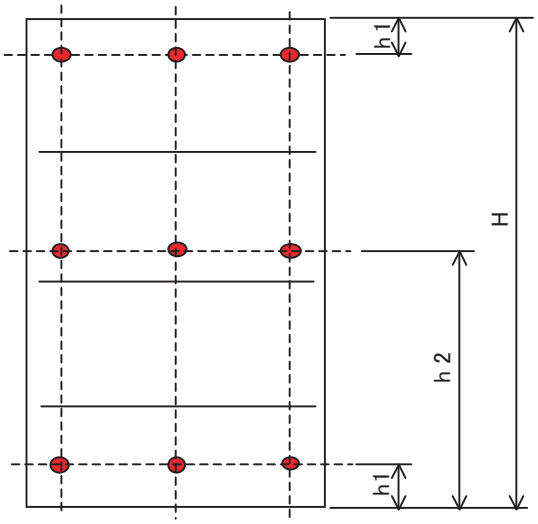
Note) The data are the reference only.

＜Measurement points＞

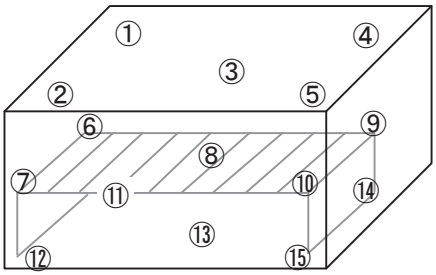
h1：H×5%
h2：H×50%

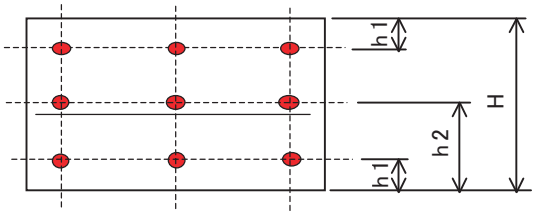
Refrigerator



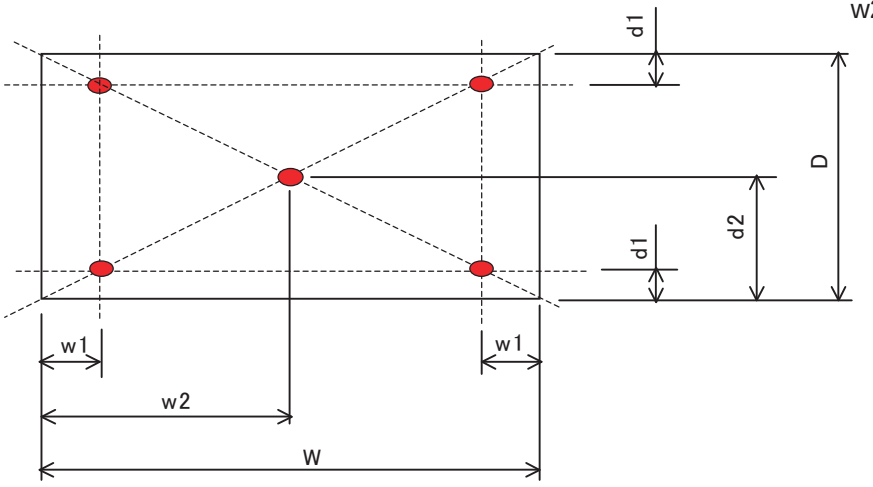


Freezer (15points)





d1：D×5%
d2：D×50%
w1：W×5%
w2：W×50%



Note) This data does not represent a guarantee of product performance.

＜Conditions＞
Ambient temperature: 20℃
Load: Unloaded

＜Distribution data＞

Unit:℃

		Ambient temperature 20℃							
		Set value (Refrigerator/Freezer) : 5/-20℃				Set value (Refrigerator/Freezer) : 5/-30℃			
		Maximum	Minimum	Middle of cycle	Differential	Maximum	Minimum	Middle of cycle	Differential
Refrigerator	①	7.3	0.4	4.0	±3.5	7.4	0.3	4.0	±3.6
	②	7.1	1.8	4.5	±2.7	7.2	1.8	4.5	±2.7
	③	7.0	1.9	4.5	±2.6	7.0	1.6	4.4	±2.7
	④	6.9	1.9	4.4	±2.5	7.0	1.8	4.4	±2.6
	⑤	7.0	2.1	4.5	±2.5	7.0	2.0	4.5	±2.5
	⑥	6.3	2.9	4.6	±1.7	6.4	2.8	4.6	±1.8
	⑦	6.9	2.7	4.7	±2.1	6.9	2.6	4.7	±2.2
	⑧	6.6	3.5	5.0	±1.6	6.7	3.4	5.0	±1.7
	⑨	6.2	3.8	4.9	±1.2	6.3	3.8	5.0	±1.3
	⑩	6.7	4.7	5.7	±1.0	6.7	4.7	5.7	±1.0
	⑪	7.0	3.3	5.0	±1.9	6.9	3.1	4.9	±1.9
	⑫	7.2	3.9	5.4	±1.7	7.1	3.8	5.4	±1.7
	⑬	6.9	2.8	4.8	±2.1	6.8	2.8	4.7	±2.0
	⑭	6.7	2.8	4.7	±2.0	6.7	2.7	4.6	±2.0
	⑮	6.9	3.8	5.3	±1.6	6.8	3.7	5.2	±1.6
	Average	-	-	4.8	-	-	-	4.8	-
Freezer	①	-19.9	-24.7	-22.3	±2.4	-29.4	-32.8	-31.1	±1.7
	②	-16.7	-19.4	-18.1	±1.4	-24.8	-27.3	-26.1	±1.3
	③	-19.1	-22.4	-20.8	±1.7	-28.0	-30.2	-29.1	±1.1
	④	-19.7	-24.1	-21.9	±2.2	-29.0	-32.3	-30.7	±1.7
	⑤	-16.1	-18.7	-17.4	±1.3	-24.0	-26.2	-25.1	±1.1
	⑥	-19.7	-20.8	-20.3	±0.6	-28.9	-29.8	-29.4	±0.5
	⑦	-19.9	-20.7	-20.3	±0.4	-29.1	-29.6	-29.4	±0.3
	⑧	-20.2	-21.0	-20.6	±0.4	-29.4	-30.0	-29.7	±0.3
	⑨	-20.1	-21.3	-20.7	±0.6	-29.3	-30.2	-29.8	±0.4
	⑩	-19.9	-20.7	-20.3	±0.4	-29.0	-29.6	-29.3	±0.3
	⑪	-20.5	-24.9	-22.7	±2.2	-30.2	-33.8	-32.0	±1.8
	⑫	-20.1	-24.5	-22.3	±2.2	-29.9	-33.5	-31.7	±1.8
	⑬	-20.2	-27.5	-23.9	±3.7	-29.8	-35.8	-32.8	±3.0
	⑭	-20.0	-23.5	-21.8	±1.8	-29.5	-32.1	-30.8	±1.3
	⑮	-19.9	-23.1	-21.5	±1.6	-29.5	-32.1	-30.8	±1.3
	Average	-	-	-21.0	-	-	-	-29.8	-

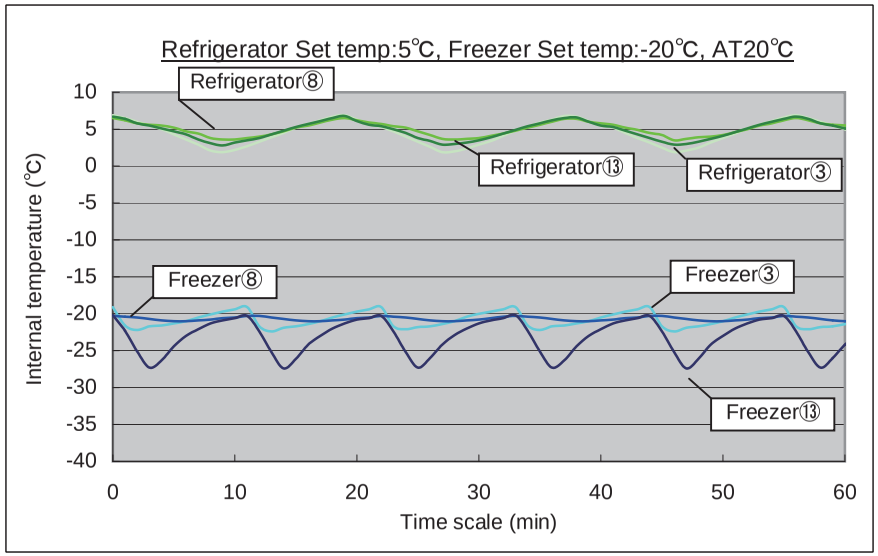
Note) This data does not represent a guarantee of product performance.

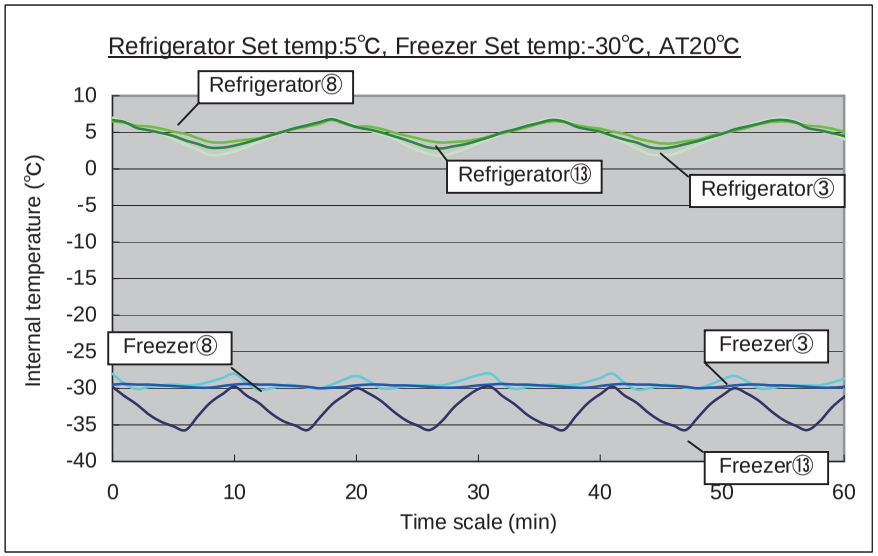
＜Conditions＞
Ambient temperature: 30℃
Load: Unloaded

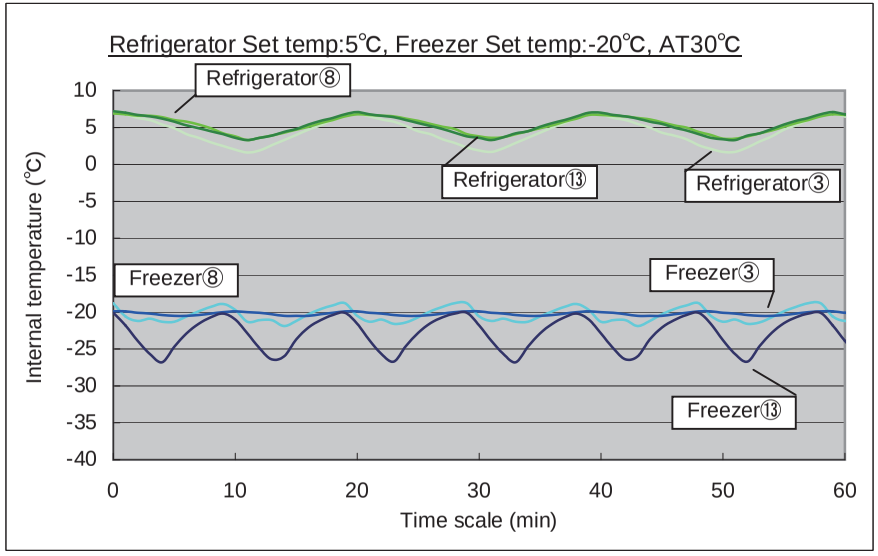
＜Distribution data＞

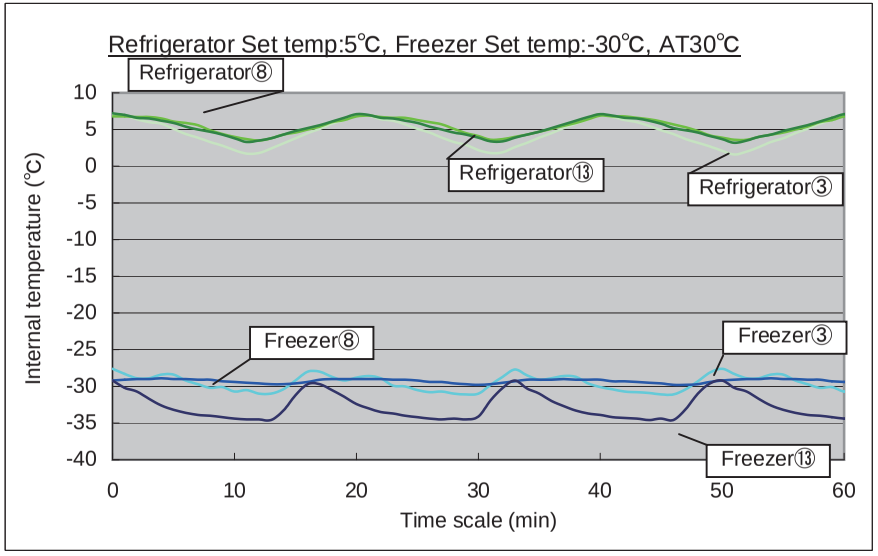
Unit:℃

		Ambient temperature 30℃							
		Set value (Refrigerator/Freezer) : 5/-20℃				Set value (Refrigerator/Freezer) : 5/-30℃			
		Maximum	Minimum	Middle of cycle	Differential	Maximum	Minimum	Middle of cycle	Differential
Refrigerator	①	7.2	0.1	3.7	±3.6	7.3	0.2	3.8	±3.6
	②	7.5	3.0	5.1	±2.3	7.5	3.2	5.2	±2.2
	③	7.1	1.5	4.3	±2.8	7.1	1.5	4.4	±2.8
	④	7.0	1.4	4.3	±2.8	7.0	1.5	4.4	±2.8
	⑤	7.2	2.0	4.6	±2.6	7.2	2.1	4.7	±2.6
	⑥	6.4	3.1	4.8	±1.7	6.5	3.2	5.0	±1.7
	⑦	7.2	3.5	5.3	±1.9	7.3	3.5	5.4	±1.9
	⑧	6.9	3.3	5.3	±1.8	7.0	3.3	5.4	±1.9
	⑨	6.4	4.1	5.3	±1.2	6.4	4.1	5.4	±1.2
	⑩	7.4	5.4	6.5	±1.0	7.5	5.4	6.6	±1.1
	⑪	7.4	3.6	5.5	±1.9	7.4	3.6	5.6	±1.9
	⑫	7.8	4.2	6.1	±1.8	7.8	4.2	6.1	±1.8
	⑬	7.2	3.1	5.2	±2.1	7.2	3.2	5.3	±2.0
	⑭	7.0	3.1	5.1	±2.0	7.0	3.2	5.1	±1.9
	⑮	7.6	4.3	6.0	±1.7	7.4	4.3	6.0	±1.6
	Average	-	-	5.1	-	-	-	5.2	-
Freezer	①	-19.7	-24.7	-22.2	±2.5	-28.7	-32.8	-30.8	±2.1
	②	-15.8	-18.5	-17.2	±1.4	-24.0	-26.1	-25.1	±1.1
	③	-18.7	-22.1	-20.4	±1.7	-27.6	-31.2	-29.4	±1.8
	④	-19.4	-24.0	-21.7	±2.3	-28.6	-32.1	-30.4	±1.8
	⑤	-14.9	-17.3	-16.1	±1.2	-23.1	-24.7	-23.9	±0.8
	⑥	-19.3	-20.4	-19.9	±0.5	-28.3	-29.6	-29.0	±0.7
	⑦	-19.5	-20.2	-19.9	±0.4	-28.5	-29.4	-29.0	±0.4
	⑧	-19.9	-20.5	-20.2	±0.3	-28.9	-29.8	-29.4	±0.5
	⑨	-19.7	-20.9	-20.3	±0.6	-28.7	-30.1	-29.4	±0.7
	⑩	-19.4	-20.1	-19.8	±0.4	-28.5	-29.3	-28.9	±0.4
	⑪	-20.4	-24.4	-22.4	±2.0	-29.8	-33.2	-31.5	±1.7
	⑫	-20.0	-23.9	-22.0	±2.0	-29.4	-32.7	-31.1	±1.7
	⑬	-20.1	-26.8	-23.5	±3.4	-29.2	-34.7	-32.0	±2.8
	⑭	-19.6	-22.8	-21.2	±1.6	-28.8	-31.5	-30.2	±1.4
	⑮	-19.6	-22.6	-21.1	±1.5	-28.9	-31.5	-30.2	±1.3
	Average	-	-	-20.5	-	-	-	-29.3	-


Refrigerator Set temp:5℃, Freezer Set temp:-20℃, AT20℃
Refrigerator⑧
Refrigerator⑬
Refrigerator③
Freezer⑧
Freezer③
Freezer⑬
Internal temperature (℃)
Time scale (min)


Refrigerator Set temp:5℃, Freezer Set temp:-30℃, AT20℃
Refrigerator⑧
Refrigerator⑬
Refrigerator③
Freezer⑧
Freezer③
Freezer⑬
Internal temperature (℃)
Time scale (min)


Refrigerator Set temp:5℃, Freezer Set temp:-20℃, AT30℃
Refrigerator⑧
Refrigerator⑬
Refrigerator③
Freezer⑧
Freezer③
Freezer⑬
Internal temperature (℃)
Time scale (min)


Refrigerator Set temp:5℃, Freezer Set temp:-30℃, AT30℃
Refrigerator⑧
Refrigerator⑬
Refrigerator③
Freezer⑧
Freezer③
Freezer⑬
Internal temperature (℃)
Time scale (min)

＜Amount of power consumption＞

Amount of power consumption when driving at cycle

Unit：kWh/day

Ambient temperature	15℃		20℃		23℃		30℃	
Set value (Refrigerator/Freezer)	5/-20 ℃	5/-30 ℃	5/-20 ℃	5/-30 ℃	5/-20 ℃	5/-30 ℃	5/-20 ℃	5/-30 ℃
110V60Hz	2.66	3.13	2.84	3.29	2.95	3.41	3.25	3.77
115V60Hz	2.74	3.20	2.88	3.41	3.01	3.52	3.29	3.88
220V50Hz	2.32	2.64	2.48	2.85	2.59	2.95	2.86	3.27
230V50Hz	2.46	2.81	2.61	3.00	2.70	3.11	2.98	3.41
240V50Hz	2.59	2.95	2.75	3.12	2.88	3.24	3.12	3.54
220V60Hz	2.67	3.08	2.86	3.29	2.99	3.42	3.33	3.77

Note:This data does not represent a guarantee of product performance.